NetworkWorld
TECHNICAL SEMINARS

Inter*networking*:

DESIGNING LANs, WANs & BROADBAND NETWORKS

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Bridgewater State College

"Mark is one of the best at simplifying key points and getting them across."
Tom Hull, Manager, New Product Introduction
Xyplex

Presented by Mark Miller

1996 Seminar Locations & Dates

Irvine, CA	January 17–18	**Atlanta, GA**	April 16–17
Dallas, TX	February 12–13	**Washington, DC**	April 23-24
New York, NY	February 27–28	**Chicago, IL**	May 7–8
Philadelphia, PA	March 12–13	**Boston, MA**	May 14–15
Orlando, FL	March 14–15	**San Francisco, CA**	June 11–12

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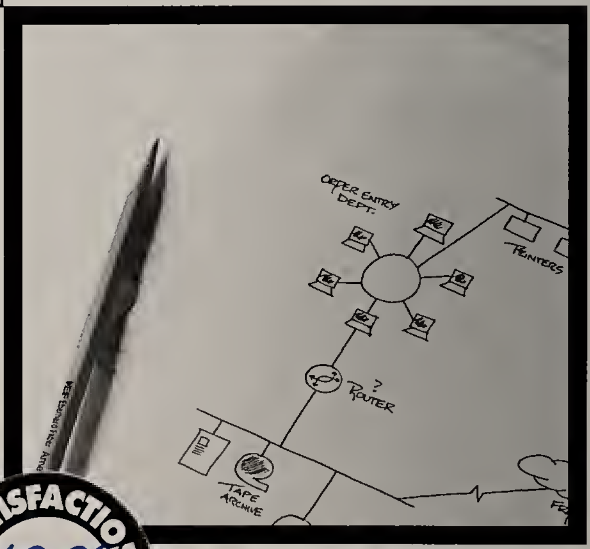
The ever-changing internetworking landscape, fueled by emerging broadband technologies, dramatically challenges traditional LAN and WAN architectures. Network professionals must now integrate local and wide-area networks with new technologies including Fast Ethernet, ATM, frame relay and SMDS. These and other new technologies hold the promise of more efficient and ever-faster communications across enterprise networks.

Directed and taught by Mark Miller, author of seven best-selling books on internetworking technologies, this seminar will teach you how to design and implement multiprotocol, multioperating system internetworks that seamlessly integrate both legacy and emerging technologies.

Inter*networ*k*ing: DESIGNING LANs, WANs & BROADBAND NETWORKS

This information-packed two-day seminar will help you . . .

- Evaluate internetworking hardware and software solutions for optimum network design and performance, and review over 40 available products
- Analyze repeaters, bridges, switches, routers and gateways to determine which one is appropriate for particular configurations
- Prepare for the next generation of internetworking challenges: Frame relay/SMDS, frame relay/ATM and SMDS/ATM connections
- Understand key internetworking protocols, including TCP/IP, IPX/SPX, X.25 and XNS
- Utilize traffic studies to determine bandwidth requirements for both leased line and broadband circuits
- Troubleshoot your environment through case studies that detail protocol operation, and illustrate typical internetworking problems and solutions, including Ethernet fragments, the token ring route discovery process and FDDI station management
- Understand the key internetworking features of AppleTalk, Banyan VINES, NetWare, OS/2 LAN Server and Windows NT
- Discover some key applications for narrowband ISDN technology
- Compare the technologies and operation of ATM, frame relay and SMDS, and discover the role of the broadband implementers: the Frame Relay Forum, the ATM Forum and the SMDS Interest Group
- Understand the detailed operation and key performance characteristics of Ethernet, IEEE 802.3, token ring and FDDI



SATISFACTION 100% GUARANTEED

- Evaluate the differences between Transparent Bridging, Source Routing and Source Routing Transparent Bridging internetworking standards
- Utilize available software tools for network optimization and modeling
- Evaluate application gateways that connect LANs, minicomputers and legacy systems
- See how SNMP plays a key role in internetwork management including the management and operation of broadband networks
- Understand the operation of IP-based routing
- Understand TCP/IP and the Internet protocol suite, including ARP, ICMP, UDP, SMTP, TELNET
- Explore the internetworking challenges of remote access and wireless communications
- Match the LAN application with the appropriate WAN broadband technology

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About The Presenter

Mark Miller
President,
DigiNet Corporation

Mark has been directly involved with data communication systems and computer networks since 1976. Prior to founding DigiNet Corporation, he held engineering and management positions with Southwestern Bell Telephone Company, Bell Telephone Laboratories and AT&T. Mark has lectured internationally on data communication system design, and the design, troubleshooting and management of complex internetworks.

Mr. Miller is a Contributing Editor to *Network World* and a member of the Steering Committee for the worldwide ComNet Conferences. Recently, Mr. Miller was the course director of Network World's highly popular seminar series' entitled Analyzing Broadband Networks, TCP/IP: Analyzing the Protocols of the Internet and Internetwork Management: Understanding SNMP & SNMPv2. He is also the author of *Network Troubleshooting Library* series published by M&T Books, Inc. Titles include the *LAN Troubleshooting Handbook 2nd ed., LAN Protocol Handbook, Internetworking: A Guide to Network Communications 2nd ed.,Troubleshooting Internetworks, Troubleshooting TCP/IP, Managing Internetworks with SNMP* and *Analyzing Broadband Networks.* Mark holds both BS and MS degrees in Electrical Engineering, and is a member of IEEE and NSPE. He is a Registered Professional Engineer in Colorado, Arizona, Wyoming and Kansas.

“ ”

"One of the best seminars I have attended. Mark is a very knowledgeable and polished instructor."
Erich S.L. Richey
Network Manager
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"Excellent job by Mark!"
Manager, Network Services
GSA

"My third course led by Mark Miller. All well worth the time and my company's money."
Mike Lenox
Senior Engineer
TxPort

"Mark is an excellent teacher, very good use of illustrations!"
Al Kovalick
Principal Engineer
Hewlett-Packard

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- FOUR EXCLUSIVE PROTOCOL REFERENCE GUIDES: ETHERNET, TOKEN RING, FDDI AND LAN CABLING
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Business News & Analysis of Frame Relay, ATM, and SMDS

NOTE: IF YOU CAN'T ATTEND, A FULL ATTENDEE MATERIALS KIT IS AVAILABLE FOR JUST $99.95!

Seminar OUTLINE

Internetworking Principles and Standards

In this section, we will use the OSI Reference Model to compare various architectures, systems, and standards, thus providing the groundwork for more complex discussions.

- Internetworking History
- Open Systems Interconnection Principles
- OSI Protocols for Internetworking
- Legacy Architectures: SNA and DECnet
- Applying Connectivity Devices to the OSI Model: Repeaters, Bridges, Switches, Routers and Gateways
- IEEE Project 802
- LAN Frame Formats: Ethernet, IEEE 802.3, IEEE 802.5, ARCNET and FDDI
- IEEE Bridging Standards: Transparent Bridging, Source Routing and Source Routing Transparent Bridging
- Case Study 1: Ethernet Fragments
- Case Study 2: Token Ring Route Discovery
- Case Study 3: FDDI Station Management

LAN-to-LAN Internetworking

This section will investigate traffic and throughput considerations of the LAN-to-LAN connection, and also discuss the operation of, and appropriate applications for, internetworking devices: repeaters, bridges, switches and routers.

- Designing the LAN-to-LAN Connection: Repeating, Bridging, Switching or Routing?
- Analyzing the Network — Network Traffic and Its Impact on Throughput and Delay
- Connecting Dissimilar LANs
- Repeater Examples: Andrew Corporation, Cabletron Systems and SMC
- Bridge and Switch Examples: Retix, IBM, UB Networks and Solectek
- Bridge/Router Examples: 3Com and ACC Protocol Operation of IP-Based Routing
- Router Examples: Proteon and Cisco

Analog and Digital Data Transmission Facilities for Internetworks

Carrier-provided transmission systems include a wide variety of analog and digital leased lines, from dial-up connections through broadband facilities. This section will investigate the technical background of WAN circuits, including transmission line parameters, T-carrier facilities, packet switched networks and ISDN.

- Dial-Up Telephone Network Facilities
- Analog Leased Line Facilities — transmission parameters and conditioning
- Digital Leased Lines — North American Digital Transmission Hierarchy and framing formats
- Fractional T-1
- Packet Switched Public Data Networks — access, rate structures and value-added network services
- Integrated Services Digital Networks (ISDNs)
- The Future of WAN Technologies
- Remote Access to Internetworks
- Case Study 4: Software Tools for Network Optimization

X.25 Protocols

The X.25 protocol has had a profound influence on current WAN technologies, including ISDN, frame relay and ATM. In addition, it is a viable option for global internetworks. This section will consider the architecture of the X.25 interface, and look at various LAN products that take advantage of this technology.

- Packet Switched Public Data Networks Development
- PSPDN Architecture
- The X.25 Physical Layer
- The X.25 Data Link Layer
- The X.25 Network Layer
- X.25 Related Protocols
- Virtual Call Establishment
- Interfaces to Other WANs: X.31, X.32 and X.75
- X.25 Internetworking Examples from Crystal Point, Inc., Eicon Technology, Attachmate and Microtronix

Broadband Networking

For many network managers, the bandwidth provided by more traditional communication systems, such as analog dial-up connections, digital leased lines, packet switching or ISDN, is not adequate to support their applications. Broadband networking alternatives, such as frame relay, Switched Multimegabit Data Service (SMDS) and Asynchronous Transfer Mode (ATM) solve those bandwidth requirements in a dramatic way. This chapter will discuss the foundations of broadband networks, with a special emphasis on the evolving standards and applications.

- Broadband Transmission Technologies
- Comparing Broadband Networks with OSI
- Broadband Transmission Rates, Network Economics and Interfaces
- Frame Relay: Standards, the User-Network Interface, Frame Format, Congestion Control and Internetworking
- SMDS: Standards, the Subscriber-Network Interface, the SMDS Interface Protocol, PDU Formats, Addressing, the Data Exchange Interface (DXI) Operation and Internetworking.
- ATM: Standards, Interfaces, Virtual Connections, Management and Internetworking.
- Broadband Internetworking Examples: CompuServe Network Services FRAMENet FRAD, Pacific Bell SMDS with TCP/IP and AT&T InterSpan ATM Service

LAN-to-WAN Internetworking

Enterprise-wide internetworks are rarely built from scratch. Instead, they evolve, perhaps from mainframe or minicomputer-based networks, adding LAN, remote office and remote access capabilities along the way. This section will study the process of designing the LAN-WAN internetwork, using transmission facilities ranging from leased lines to broadband networks.

- Designing the LAN-WAN Connection: Leased Line, Frame Relay, SMDS and ATM Network Configurations
- Communication Servers — J&L Information Systems Network Communications Server
- Analog Leased Line Connections — Examples from Microcom and Rockwell Network Systems
- Digital Leased Line Connections — MICOM's Marathon Multiplexers
- Designing Scalable LAN-WAN Connections — Examples from Newport Systems Solutions
- Frame Relay Connections — Examples from RAD Data Communications
- SMDS Network Connections — Examples from Digital Link
- ATM Network Connections — Examples from FORE Systems

TCP/IP and the Internet Protocols

The Transmission Control Protocol/Internet Protocol (TCP/IP) suite is perhaps the best known of all the internetworking protocols. This suite operates on virtually all systems, from the smallest notebook to the largest mainframe. This chapter will focus on this popular solution for internetworking challenges.

- The Birth of the Internet
- The ARPA Protocol Suite
- ARPA Network Interface Layer Alternatives: Ethernet, IEEE 802, ARCNET, FDDI and Broadband Networks
- The ARPA Internet Layer: IP Router Operation, the Internet Protocol (IP) Header, IP Network Addresses, IP Routing Protocols and the Internet Control Message Protocol (ICMP)
- ARPA Host-to-Host Layer Protocols: Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP)
- ARPA Higher Layer Protocols
- The Future of TCP/IP
- TCP/IP Internetworking Examples: NetManage Chameleon, Wollongong Pathway, Novell's LAN WorkPlace and Xyplex Access Server
- Case Study 5: Diagnosing Incompatible Terminal Types

XNS Protocols

The Xerox Network Systems (XNS) protocol suite has provided the cornerstone for many other internetworking architectures, including AppleTalk, Banyan VINES and Novell's NetWare. This section will look at the architecture of XNS, and see how elements of that architecture have been implemented in other systems.

- XNS Internetwork Architecture
- Datagram Addressing and Routing Within XNS
- XNS Levels 0–4 — Layer Operation
- XNS Implementations

Networking Software, Internetworking and Interoperability

Most internetworks require the integration of multiple protocols to connect LANs, WANs and legacy systems such as DECnet or SNA. This section will explore the architectures of five popular internetworking suites, with a special focus on the internetworking and interoperability capabilities.

- Apple Computer AppleTalk: Architecture, Protocols and Interoperability Products
- Banyan VINES: Architecture, Protocols and Communication Options
- Novell NetWare 3 and 4: Client Products and Network Access Products
- Microsoft Windows NT: Architecture and Networking
- IBM OS/2 LAN Server: Architecture and Multi-Protocol Transport Networking

Gateways

Gateways operate at the highest layer of the OSI model, and provide logical connections between applications. In this section, we will illustrate some of the many gateway products available for connecting LANs, minis and mainframes.

- BLAST Software — BLAST, Inc.
- Beame & Whiteside BW — MultiConnect for Solaris
- Innosoft International PMDF — Interconnect for Email
- Shiva FastPath 5 Ethernet to AppleTalk Gateway
- Andrew NetAxcess AppleTalk to AS/400 Gateway
- Miramar Systems MACLAN Connect
- Hewlett-Packard OfficeShare — Netware Gateway
- Attachmate LAN — Gateway and PEPGate/TCP
- FEL LANLink — DECnet Gateway
- InterConnections Leverage Host Services
- Data Interface Systems DI3270 Gateway
- Micro — Integration Gateways

Implementing the Internetwork

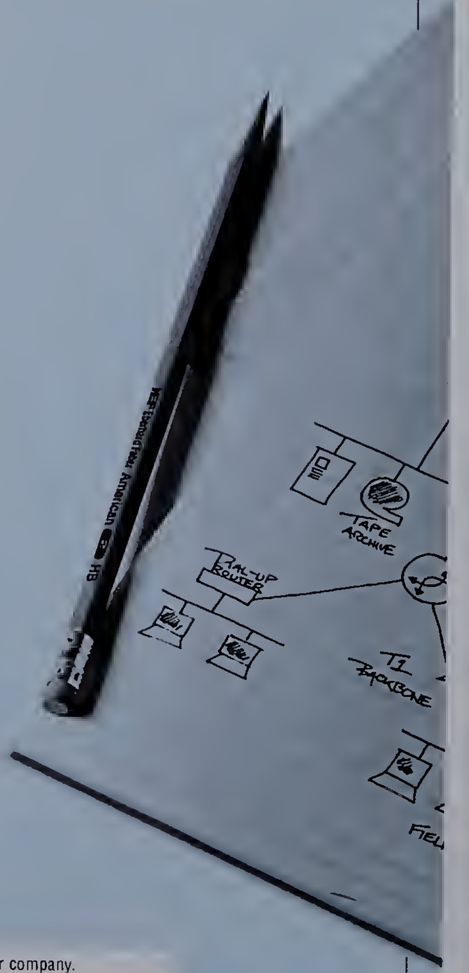
It's one thing to study internetworking theory, but it's something entirely different to place an internetwork into operation. This section will study a forty-step plan for internetwork implementation, providing a roadmap that will take the internetwork designer from concept, design, installation and testing, to full operation.

- Project Concepts: Budget, System Requirements and Architecture
- The Design Process
- Network Management Factors: Reliability, Testing and Security
- Budgets and Schedules
- System Cutover and Acceptance Procedures
- Infrastructure: WAN Connections, Internet Access and Cabling
- Installation and Testing Procedures
- Troubleshooting Procedures
- Network Documentation
- On-Going Support and Help-Desk Procedures

Managing the Internetwork

Networks are dynamic, evolving entities, and require on-going management for successful operation. This section will study the concepts of internetwork management, and investigate how the Simple Network Management Protocol (SNMP) has become the standard for all phases of the internetwork: LAN, MAN and WAN.

- The Specific Management Functional Areas
- The Agent/Manager Model
- The Structure of Management Information (SMI)
- Management Information Bases (MIBs)
- Network management communication using SNMP
- Remote Monitoring (RMON)
- The Future of SNMP
- Case Study 6: Remote Router Management



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If three or more registrations are made at the same time for members of the same organization, you may deduct $100.00 off each registration fee!

SEMINAR TIMES/LOCATIONS

Registration for this seminar will begin at 8:00 a.m. on the first day of the seminar. The seminar will begin promptly at 9:00 a.m. and will end at 5:00 p.m. on both seminar days. The seminar meeting room will be posted in the hotel lobby. The luncheon room location will be announced at the seminar.

HOTEL

We have reserved a limited number of overnight rooms on an individual call-in basis at each hotel for seminar attendees. If you require a room, please contact the hotel listed on your seminar confirmation form as soon as possible since the rooms are held for a limited time. When calling, please indicate that you will be attending the *Network World Technical Seminar* in order to receive a preferred room rate.

CANCELLATION POLICY

Cancellations must be received in writing at least 10 business days prior to the seminar date in order to receive a full refund. After this date, any cancellation will be subject to a $125 cancellation charge, which may be applied to any future *Network World Technical Seminar*. Any registrant who does not attend a seminar and has not previously canceled will still be liable for the entire seminar fee. You may make an attendee substitution at any time. In the unlikely event that a seminar date must be canceled, Network World, Inc. will be liable for a refund of the seminar fee only.

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The Continuing Education Unit (CEU) is the nationally recognized standard unit awarded for participation in qualified programs of Continuing Education. 1.3 CEUs will be awarded for this seminar.

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Internetworking: Designing LANs, WANs & Broadband Networks Seminar Dates & Locations

☐	**JAN 17–18**	**IRVINE, CA** - IRVINE MARRIOTT
☐	**FEB 12–13**	**DALLAS, TX** - INFOMART
☐	**FEB 27–28**	**NEW YORK, NY** - DOUBLETREE GUEST SUITES
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☐	**MAR 14–15**	**ORLANDO, FL** - EMBASSY SUITES
☐	**APR 16–17**	**ATLANTA, GA** - LOCATION TO BE ANNOUNCED
☐	**APR 23-24**	**WASHINGTON, DC** - LOCATION TO BE ANNOUNCED
☐	**MAY 7–8**	**CHICAGO, IL** - LOCATION TO BE ANNOUNCED
☐	**MAY 14–15**	**BOSTON, MA** - LOCATION TO BE ANNOUNCED
☐	**JUNE 11–12**	**SAN FRANCISCO, CA** - LOCATION TO BE ANNOUNCED

▶ METHOD OF PAYMENT (PAYMENT IS DUE PRIOR TO SEMINAR DATE)

COURSE FEE

$895.00 per person includes 2-day seminar, course materials, luncheons, morning and afternoon refreshments.
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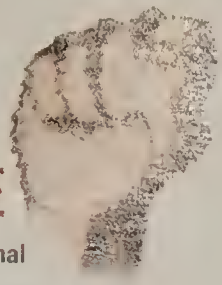
JANUARY 15, 1996 VOLUME 13, NUMBER 3

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING



CALL TO END HATE

Simon Wiesenthal Center asks Internet providers to stamp out offensive sites.

See page 9.

Wrangling threatens ATM Forum

Some progress is made despite bickering, splintering and vendors' proprietary urges.

By Michael Cooney
and Jodi Cohen

George Swallow, *a forum working group chair, says dissension is a natural byproduct of democratic debate.*

Asynchronous Transfer Mode products are starting to hit their stride in the marketplace, but the organization that has championed ATM technology may be hitting the wall.

Critics say the spirit of cooperation and camaraderie the ATM Forum once enjoyed has deteriorated into infighting, delays and a blurring of the group's mission — charges that forum officials deny.

Among the examples of forum gridlock: The group has not settled on how multiprotocol data or voice traffic should be treated in an ATM network, and as a result, splinter groups have formed to push their own approaches.

Also, when the forum chose a 51M bit/sec ATM-to-the-desktop standard, a powerful group of vendors — the Desktop ATM25 Alliance — took matters into

See ATM Forum, *page 58*

Intel uses clout to stop huge ISDN rate hike in its tracks

By Joanie Wexler
and Tim Greene

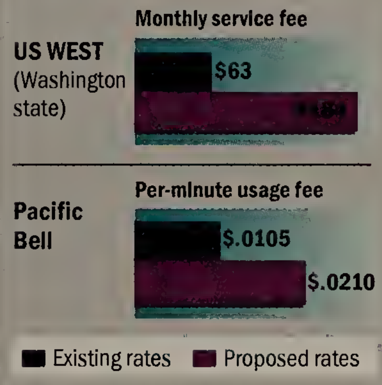
A wrist-slapping message was sent to the RBOCs last week by a state utility commission that took Intel's advice and quashed US WEST, Inc.'s plans to triple ISDN service rates.

The denial of a US WEST tariff filing in Washington state to increase ISDN rates spelled at least a short-term victory for users around the country who are mounting protests against similar hikes proposed by local exchange carriers.

See ISDN, *page 16*

HOPED-FOR HIKES

US WEST and Pacific Bell have proposed big ISDN price increases: US WEST's are targeted at monthly service fees and PacBell's at per-minute usage charges.



Cabletron preps token blowout

By Jodi Cohen
Rochester, N.H.

Bob Travis *says Cabletron's new SmartSwitch will offer about 20 switched ports.*

Cabletron Systems, Inc. is readying a broad token-ring switching strategy that extends from the workgroup to the backbone and includes the company's first token-ring switch module for its high-end MMAC-Plus hub.

The token-ring blowout, scheduled for the upcoming ComNet '96 conference in Washington, D.C., will be the latest in a series of Cabletron efforts to help bandwidth-hungry customers upgrade from shared-media to switched LANs. The company already has unveiled plans for Ethernet, FDDI and Asynchronous Transfer Mode switching products.

The highlight of Cabletron's ComNet announcement will be the introduction of its Multi Media Access Center-Plus SmartSwitch module. The token-ring switch will offer about 20 switched ports and a forwarding rate of 750,000 packet/sec, according to Bob Travis, Cabletron's token-ring and SNA product manager.

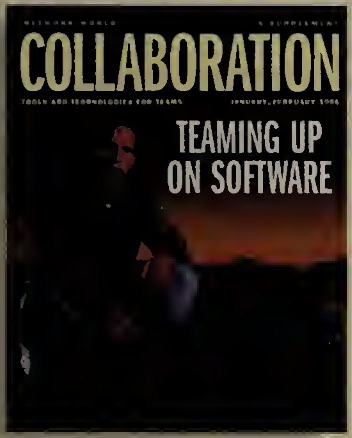
See Cabletron, *page 16*

What a relief

Are your token rings tapped out? This week's feature will help you ease the congestion.

Page 39.

TERRY COLON



Developing a million lines of code using people scattered around the world? The secret is carefully orchestrated team effort, Motorola says.

See *Collaboration*. Follows page 36.

Can the 'Net save Apple?

By Peggy Watt
San Francisco

A dozen years after the debut of Macintosh, Apple Computer, Inc. needs to start a new orchard, and cyberspace may be just the spot.

Apple's third-party developers — always key to the company's survival — already have seized on the Internet as a promising new market.

At MacWorld Expo here last week, Internet wares were as prevalent as desktop publishing was a decade ago. Dominant were development tools, browser utilities, Web builders and managers, and modems.

Doug McLean, *director of Apple's CyberTech Products, says the 'Net is very strategic for the firm.*

It's not that Apple has overlooked the Internet market. It sells client and server hardware and software, and has bundled TCP/IP with the MacOS for several years. Apple's previously proprietary on-line community, e-World, has even moved onto the Web.

But the Cupertino, Calif., computer pioneer lacks a cohesive Internet strategy and seems distracted by recent woes, including the flight of dozens of Apple executives, $68 million in losses in the company's most recent quarter — traditionally its strongest — and pending layoffs disclosed during the typically ebullient MacWorld show.

"Apple needs to make a mission statement along the lines of what we heard from Microsoft last month," said Allen Weiner,

See Apple, *page 58*

Bite into Apple on-line:

- **Learn how to set up Apple Internet servers**
- **Take a gander at third-party tools**
- **Subscribe to Apple Internet-related mailing lists**

From the main menu, select News+ then Electronic Commerce.

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Penril pitches mix 'n' match remote access

By Tim Greene
Gaithersburg, Md.

Penril Datability Networks, Inc. will soon storm the booming remote access market with a product that supports virtually any configuration of WAN and LAN network interfaces.

The Access Beyond family lets users mix and match five different chassis, 11 interfaces and four separate software modules to consolidate corporate remote access. The line will be announced at ComNet '96 in Washington, D.C. later this month.

Depending on choice of software, Access Beyond can function as a bridge/router, terminal

See Penril, *page 8*

Access Network World Fusion using the number in yellow. See page 5 for details.

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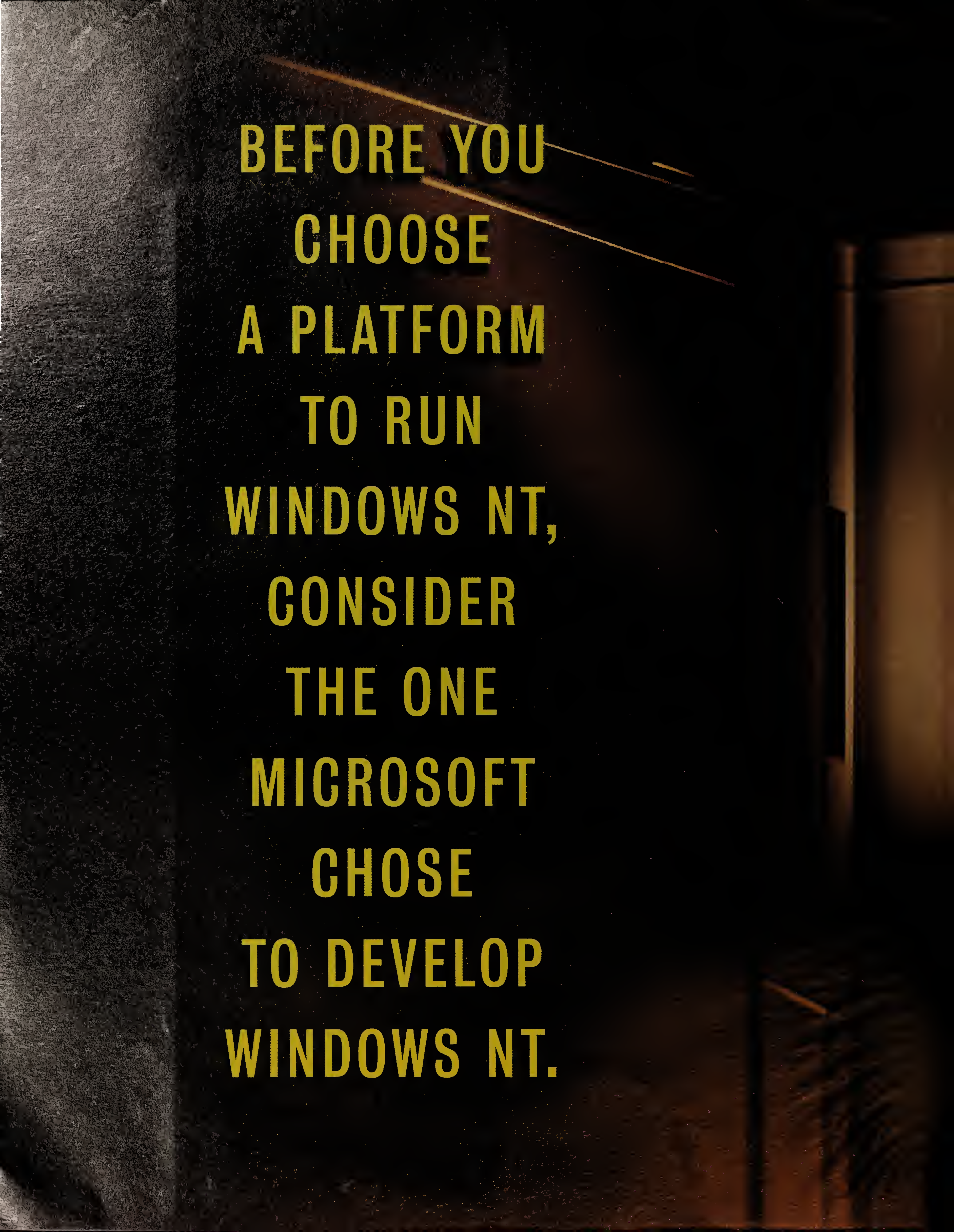
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This Week

News+

The Front Page:

- Compare detailed ISDN pricing for the regional Bell operating companies and pore through Washington state's on-line docket about its denial of US WEST's proposed rate increase.
- Cabletron is planning an ambitious move into token-ring switches, but so are its competitors. Read articles about their plans.
- Bone up on CyberDog, Apple's plan to integrate the Web with OpenDoc.

The Technical Sections:

- The *Washington Post* was to be a key information provider on the AT&T Interchange network. Read an insider's account of how the *Post* planned to develop an on-line newspaper, in WANs & Internetworking.
- See what users of PowerBuilder are saying about the next major release of the software, in Client/Server Applications.
- Read up on Secure Socket Layer encryption, in Electronic Commerce.

Forum

Your side:

Our editorials go interactive this week. Read them, then post your comments.

Other areas:

- **Professional Development:** New seminars.
- **DirectConnect:** Download demo software.
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this week's pick

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NetworkWorld's *Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.*

News briefs, January 15, 1996

Bay to enter 25M bit/sec ATM fray

■ Bay Networks, Inc. and First Virtual Corp. next week will announce an OEM agreement under which Bay will resell First Virtual's 25M bit/sec workgroup ATM switch, 25M bit/sec network interface card and Multimedia Operating System software for desktop multimedia applications. The companies have also agreed to make the switch manageable via Bay's Optivity software. Bay will offer the First Virtual products in March under the Bay Network Multimedia Switch system name. The switch will sport eight 25M bit/sec ports, two OC-3 links and an Ethernet attachment for LAN Emulation functions.

NCR. I mean GIS. I mean NCR...

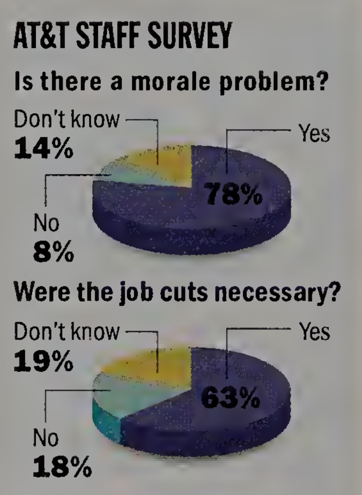
■ AT&T Global Information Solutions (GIS) last week changed its name back to NCR Corp. — the computer systems company's moniker before being acquired by AT&T in 1991. AT&T's trivestiture restructuring plan, announced in September, mandates that AT&T GIS can no longer use the AT&T name when it spins off in January 1997 as an independent, publicly traded company. AT&T GIS. . . er, NCR also said it has made Bell Laboratories its primary research arm through a multiyear agreement.

Revisiting the Oracle-Lotus deal

■ More than a year after they announced a pact to integrate their core technologies, Oracle Corp. and Lotus Development Corp. are delivering. Christian Schock, Oracle's senior director of desktop middleware technology, said Notes 4 will include LotusScript extensions to let users access Oracle data via Notes. Also, Oracle plans to give developers access to Notes data from its Developer/2000 application tool. "Despite the IBM takeover of Lotus, the relationship [between Oracle and Lotus] is solid," Schock said.

I'm safe 'cuz I serve you

■ AT&T staffers who feel most secure in their jobs despite the company's impending layoffs are those who sell and service AT&T's large users, according to a survey by Kagan Telecom Associates. Those in consumer and small-business markets, along with administrative staff, feel the least secure. AT&T employees in general report a morale problem due to the layoffs yet consider the job cuts necessary for the company to remain competitive (see graphic). Kagan surveyed 349 randomly selected AT&T employees.



SOURCE: KAGAN TELECOM ASSOCIATES, MATIETTA, GA.

IBM readies ComNet splash

■ Instead of more snow, IBM plans to dump a slew of campus switching products at the ComNet '96 show in Washington, D.C. Expected to be unveiled is the long-awaited Nways 2220 Model 200, a hybrid router/switch; the 8285 Workgroup Switch for concentrating 25M bit/sec workstations onto ATM backbones; and new high-speed LAN connectivity modules for its 8260 hub.

After NT, what's NeXT?

■ NeXT Computer, Inc. this week will ship a Windows NT version of its distributed object technology, which previously was available only on Unix computers. Now available on NT are Distributed OLE, NeXT's object model and distributed services offering, and Enterprise Objects Framework, which lets NeXT developers build objects that make use of data stored in relational databases.

MCI's remote possibilities

■ MCI Communications Corp. has partnered with software vendor Simware, Inc. to provide automated remote connectivity services to its XStream packet data and HyperStream frame relay customers. MCI will resell Simware's A2B software to cus-tomers as an enhancement to the various remote access transport services the carrier has announced over the past several months.

Lotus to plug scheduling applications at show

By Carol Sliwa

Cambridge, Mass.

Many of Lotus Development Corp.'s large Notes customers have been turning elsewhere for group calendaring and scheduling products. But an announcement scheduled for next week at the annual Lotusphere customer conference could prick up their ears.

Sources said the Lotus Organizer scheduling package will be more fully integrated with Notes. Rather than a separate Organizer database for scheduling information, the new approach is to have Notes contain that data. Expectations are that the product will be more suited for distributed and mobile use.

The approach also could solve a nagging Organizer problem: performance and memory problems. When Lotus revamped the product for group scheduling, it added a relational database. As a result, the once speedy product slowed way down and its memory requirements shot up, customers complained. Off-loading that data to Notes could help alleviate those problems.

Fred Craig, office automation manager of General Motors Corp.'s North American operations, said his company is in the process of evaluating the forthcoming integrated Organizer product.

"It certainly does have some attractive features as it becomes integrated, and that's the very thing that we're discussing right now," Craig said.

"We wouldn't change products lightly. We don't want to confuse the users," he added.

Craig said he has personal oversight of 50,000 seats for GM, which has the world's largest Notes installation with more than 100,000 licenses installed. GM has released Organizer as a personal information manager, but Campbell Services, Inc.'s OnTime is the product used by 32,000 desktops for calendaring and scheduling.

Still waiting

So far, nothing has hit the mark for WAN-based scheduling. "Neither [OnTime] nor, I think, Organizer is ready to be used as an enterprise calendar," Craig said. "We're using OnTime for group calendaring within buildings. Our ultimate goal is to do it across the enterprise."

Another big Notes customer, Ernst & Young, has not deployed Organizer, even though it was included as part of the Notes package it purchased.

Jeff Held, a partner in the management consulting practice at Ernst & Young, said the integration of Organizer with Notes should solve several "classic problems" in scheduling, including the synchronization of the name and address book and the ability to carry a copy of this when disconnected.

Because remote users can tap into Notes databases through their laptops, they would be able to access calendaring and scheduling information even when they're on the road.

Plans also call for Organizer to have an Internet hook whereby users might choose to post their free-time blocks and schedule meetings with individuals from other companies over the 'Net, sources said.

Another announcement expected at Lotusphere is that Organizer will be made available for Microsoft Corp.'s Windows 95. ■

READ MORE ON NetworkWorld Fusion
http://www.nwfusion.com
- Reviews of Organizer and competing applications
- An Organizer spec sheet
- How to get to an "Easter egg" in Organizer
- From the main menu, select News+ then Client/Server Applications.

Notes replication tool is tuned-up for the enterprise

Casahl's Replic-Action 3.0 supports SMP machines.

By Barb Cole

Danville, Calif.

Casahl Technologies, Inc. this week will announce a new edition of its Lotus Notes replication software that is better equipped to run across enterprise networks.

Replic-Action 3.0 eases management of multiple end users per server, exploiting the power of symmetrical multiprocessing (SMP) servers. Running on SMP, Version 3.0 can replicate data four times faster than the previous edition.

Replic-Action 3.0 can replicate data four times faster than the previous edition.

The software features a load-balancing facility to manage work across server clusters and enables end users to replicate data from multiple sources simultaneously, said Harry Wong, Casahl's president and chief executive officer.

Like previous versions, the software is designed to copy data among Notes databases and between Notes and some 40 Open Database Connectivity-compliant data sources. The software also can trigger workflow applications from Lotus

See Notes, *page 8*

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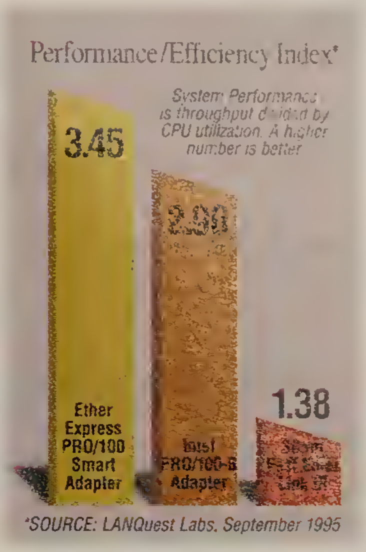

*SOURCE: LANQuest Labs, September 1995

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Hadax offers ISDN backup for dedicated lines

By Tim Greene

South Hackensack, N.J.

Hadax Electronics, Inc. will introduce at ComNet '96 this month a single device that combines the components needed to back up multiple leased lines using ISDN.

The PlusNet 3000 T&R can be configured to support as many as 30 leased lines coming into a central site with one ISDN Basic Rate Interface backup link, or fewer leased lines and more backup links.

With Hadax's current product line, the central site would need a separate backup device for each line, whereas the PlusNet 3000 T&R can back up multiple incoming links, saving customers the expense of the extra boxes and lines.

The PlusNet 3000 T&R chassis has 16 slots. Monitoring cards can each handle two 64K bit/sec lines, and each backup card supports one BRI line.

Beta tests are starting now on the PlusNet 3000 T&R. Hadax is developing a Primary Rate Interface for release in the second quarter, which will allow backup of a full T-1. That release also will include a T-1 interface directly to the PlusNet 3000 T&R.

The PlusNet 3000 T&R sits at a central site in the user network and monitors digital links to remote offices. If one of those connections fails, the PlusNet 3000 T&R establishes an ISDN connection to replace the link. For locations without ISDN, the device also supports Switched 56 service.

Backup connections are made in less than 3 seconds, according to David Foni, Hadax senior vice president.

Through Simple Network Management Protocol management software in a Hewlett-Packard Co. OpenView PC, users can configure alarm parameters to define line failures and prioritize which lines should be brought up first.

The management system also documents failures, logs numbers called and estimates bills based on rates charged by the ISDN service provider.

Steve Veitch, communications manager for Daisy Tek International, Inc. in Plano, Texas, uses four Hadax standalone ISDN backup devices now — two in Plano and two in the computer consumables firm's Memphis distribution center.

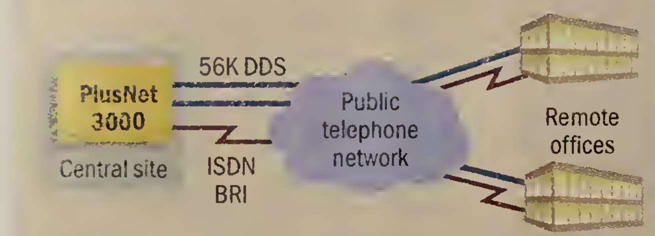
He is looking to back up the 56K bit/sec line to the company's site in Canada, too, and is considering a PlusNet 3000 T&R.

"We've got a modem rack with so much stuff in it, we're running out of room," Veitch said. "If we could merge some of that into one unit, we'd be all for that."

PlusNet 3000 T&R costs $5,000 to $15,000, depending on configuration. ■

COMNET PREVIEW

BACKING UP WITH ISDN



With PlusNet management software, the user can:
- Define failure parameters
- Prioritize lines for recovery
- Document failures
- Calculate bills for backup lines

Hadax's PlusNet 3000 T&R can back up multiple leased lines using ISDN Basic Rate Interface lines.

GRAPHIC BY SUSAN PULASKI

Notes

Continued from page 6

Development Corp.'s Notes and move relational data into workflow systems.

Replic-Action supports several replication models, including one-way and two-way, replication of selected fields and incremental updates. It handles all transformation required to make the data readable by the target database.

The software has two components: Replic-Action Composer, a client-based tool that lets end users visually create Replic-Action applications by filling out Notes forms, and Replic-Action Server, which manages those replication sessions.

Going native

The new version supports all Notes-native data types, such as rich text, multivalue lists, reader names and author names. When replication conflicts occur, the software automatically resolves them or notifies users via electronic mail.

The company also has boosted the management capabilities of Replic-Action, allowing administrators to manage multiple servers remotely using a graphical user interface. Support for the Simple Network Management Protocol is planned for Version 3.1, due in March.

Users said Replic-Action's strength continues to be its ease of use.

"You just fill out Notes forms [to set up replication sessions]," said Dan Williams, Notes developer at Buena Vista Home Video, a division of The Walt Disney Co. in Burbank, Calif. "I can train people who aren't even Notes experts to use it."

Replic-Action 3.0 runs on Windows and OS/2 servers and on any Notes-compliant client platform. A version for HP-UX servers is planned for release midyear.

Pricing is $1,500 for a Development Server and $10,000 for a Production Server.

©Casahl: (510) 736-7704.

"Replic-Action lets us get our [Sybase] data out into the field using our existing [Notes] front ends and infrastructure."

Sabu Martinez, information services manager, Ascend Communications, Inc., Alameda, Calif.

"In the earlier version [of Replic-Action], the speed of inserting and updating was OK, but deletions were very slow. That has improved in Version 3.0."

Puru Naidu, senior software engineer, Citicorp, Foster City, Calif.

"[Replic-Action 3.0] lets us pull data into Notes from our AS/400 application in about 10 minutes. That used to take more than an hour with a homegrown application programming interface."

Dan Williams, Notes developer, Buena Vista Home Video, Burbank, Calif.

Penril

Continued from page 1

server, statistical mux or multiprotocol remote access node.

When the product rollout is complete in June, users will be able to fit a chassis with their choice of what Penril calls link modules, including interfaces for T-1, 56K bit/sec digital links, Switched 56 lines, 64K bit/sec circuits, ISDN Basic Rate Interface and Primary Rate Interface, and channelized T-1.

Access Beyond also will offer what the company calls port modules: a 16-port Ethernet hub module, an eight-port V.34 and digital modem ports, PCMCIA interface cards and a 16-port asynchronous card. In addition, it will offer a module with 16 ports for data lines and private branch exchanges.

There are four Access Beyond modular chassis: the AB1200, AB2400, AB4400 and AB8400. The first digit in each product name represents the number of slots for link modules, while the second digit indicates the number of slots for port modules. So, for example, the AB2400 supports two link modules and four port modules. There also is an AB1000, which comes in two configurations.

The first is a bridge/router that can be configured Ethernet to Ethernet or Ethernet to WAN. The second is an Ethernet terminal server with eight or 16 asynchronous ports.

The final Access Beyond offering is the RAM Rack, which is a five-slot dial-in/dial-out chassis for TCP/IP, IPX, Local Area Transport (LAT) and asynchronous users.

With the initial release next month, Access Beyond will include four software options: remote access for dial-in via PPP, SLIP or CSLIP; multiprotocol bridge/routing for IP, IPX, AppleTalk and DECnet; asynchronous statistical multiplexer with X.25 packet assembler/disassembler and WAN trunks; and a terminal server supporting IP and LAT.

Access Beyond draws on technology Penril had in-house but packages it in a different way, according to analysts.

"It places them in a whole new light. They've been doing a bunch of terminal servers and modem kinds of things, but this is more of a systems approach," said Bobbie Murphy, an analyst at Dataquest, Inc.

Over the next 13 months, the company plans to strip back its current line of 125 products, comprised mainly of stand-alone boxes, to just 25 because the new modular approach will offer more flexibility without sacrificing functionality, the company said.

And the modular design allows for changing needs. "If you know you need two of these features now but you may need two more later, it gives you a lot of investment protection," said Kathryn Korostoff, an analyst at Sage Research in Natick, Mass.

Other vendors, including Cisco Systems, Inc., offer fixed-port remote access products such as CiscoPro, Murphy noted. "That's really great for a certain part of the user community, but if you think about somebody who's trying to manage 100 or 200 or 300 lines, and it's going to change over time, you want something like [Access Beyond]," she said.

Competing with the 'big boys'

Tom Pincince, an analyst with Forrester Research, Inc. in Cambridge, Mass., said the company's challenge will be competing with established vendors of large, flexible remote access devices. Users are familiar with the "big boys," and might not consider Penril.

"The question is whether they'll even be invited to the party," Pincince said.

Next month's release will include the AB1000 and AB2400, as well as 16-port asynchronous and Ethernet hub modules. It also will include an Ethernet link module, high-speed synchronous, data service unit/channel service unit and V.34 modem modules.

In March, the AB4400 will be aviailable as well as a V.34 analog/digital modem card and link modules for a high-speed CSU and BRI ISDN.

The AB1200 and AB8400 will be released in April, along with a PCMCIA card port module and PRI ISDN and channelized T-1 synchronous link modules.

©Penril: (800)473-6745.

PENRIL'S ACCESS BEYOND

The new product line features four modular chassis offering flexible remote access configurations. The modules cost extra.

Chassis model	Total slots	Price
AB1200	3	$1,595
AB2400	6	$2,000
AB4400	8	$2,200
AB8400	12	Not available

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THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

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1 Industry: (check one only)

- 01. ☐ Manufacturers (other)
- 02. ☐ Finance/Banking
- 03. ☐ Insurance/Real Estate/Legal
- 04. ☐ Health Care Services
- 05. ☐ Hospitality/Entertainment/Recreation
- 06. ☐ Media/TV/Cable/Radio/Print
- 07. ☐ Retail/Wholesale Trade/Business Services
- 08. ☐ Transportation
- 09. ☐ Utilities
- 10. ☐ Education
- 11. ☐ Process Industries (Mining/Construction/ Petroleum Refining/Agriculture/Forestry)
- 12. ☐ Government (Federal/State/Local)
- 13. ☐ Military
- 14. ☐ Aerospace
- 15. ☐ Consultants (Independent)
- 16. ☐ Carriers/Interconnects
- 17. ☐ Manufacturers (Computer/Communications)
- 18. ☐ Resellers of Computer/Network Products (VARs, VADs, Distributors)
- 19. ☐ Systems/Network Integrators
- 20. ☐ Distributors (Computer/Communications)
- 21. ☐ Other *(please specify)*__________

2 What is your job function? (check one only)

NETWORK IS MANAGEMENT:

- 1. ☐ Networking Management
- 2. ☐ LAN Management
- 3. ☐ Datacom/Telecom Management
- 4. ☐ IS, IT, MIS, Systems Management
- 5. ☐ Engineering Management
- 6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
- 7. ☐ Consultant (Independent)
- 8. ☐ Other *(please specify)*__________

3 What is the total number of sites for which you have purchase influence? (check one only)

- 1. ☐ 100+
- 2. ☐ 50 - 99
- 3. ☐ 20 - 49
- 4. ☐ 10 - 19
- 5. ☐ 2 - 9
- 6. ☐ 1
- 7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)
- 1. ☐ Corporate/Enterprise
- 2. ☐ Department
- 3. ☐ None

B. INVOLVEMENT (check all that apply)
- 1. ☐ Recommend/Specify
- 2. ☐ Approve
- 3. ☐ Evaluate
- 4. ☐ Determine the need
- 5. ☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:
B. I plan to purchase the following products/services:

A B
- ☐ 100 ☐ **LOCAL-AREA NETWORKS**
- ☐ 01. ☐ Local-Area Networks
- ☐ 02. ☐ Network Op. Sys. Software
- ☐ 03. ☐ LAN Storage/Backup
- ☐ 04. ☐ Optical LAN Storage/Backup
- ☐ 05. ☐ Disk LAN Storage/Backup
- ☐ 06. ☐ Tape LAN Storage/Backup
- ☐ 07. ☐ RAID LAN Storage/Backup
- ☐ 08. ☐ Network Test/Diagnostic Tools
- ☐ 09. ☐ Cables, Connectors, Baluns
- ☐ 10. ☐ UPS
- ☐ 11. ☐ Network Interface Cards
- ☐ 12. ☐ Peer-to-Peer LANs
- ☐ 13. ☐ SNMP Network Management
- ☐ 14. ☐ ATM Switches
- ☐ 15. ☐ Token-Ring Switches
- ☐ 16. ☐ Ethernet Switches
- ☐ 17. ☐ Remote LAN Access/Communications Servers
- ☐ 18. ☐ Superservers
- ☐ 19. ☐ File/Application Servers
- ☐ 20. ☐ Print Servers

A B
- ☐ 101 ☐ **INTERNETWORKING**
- ☐ 21. ☐ Bridges
- ☐ 22. ☐ Routers
- ☐ 23. ☐ Bridge/Router
- ☐ 24. ☐ Gateways
- ☐ 25. ☐ Intelligent Hubs/Stackables

A B
- ☐ 102 ☐ **COMPUTERS/PERIPHERALS**
- ☐ 26. ☐ Laptops/Notebooks/Sub-Notebooks
- ☐ 27. ☐ Micros/PCs
- ☐ 28. ☐ Minis
- ☐ 29. ☐ Mainframes
- ☐ 30. ☐ Workstations
- ☐ 31. ☐ Terminals
- ☐ 32. ☐ Printers
- ☐ 33. ☐ Cluster Controllers
- ☐ 34. ☐ Monitors
- ☐ 35. ☐ Fax/Modem Boards

A B
- ☐ 103 ☐ **REMOTE/WIRELESS COMPUTING**
- ☐ 36. ☐ PDAs
- ☐ 37. ☐ PCMCIA Devices
- ☐ 38. ☐ Wireless Data Services
- ☐ 39. ☐ Wireless Data Equipment
- ☐ 40. ☐ Wireless LANs
- ☐ 41. ☐ Cellular Equipment & Services

A B
- ☐ 104 ☐ **INTERNET/ELECTRONIC COMMERCE**
- ☐ 42. ☐ Internet Access Providers
- ☐ 43. ☐ Firewalls
- ☐ 44. ☐ Web Servers/Browsers
- ☐ 45. ☐ Internet Software Tools

A B
- ☐ 105 ☐ **SOFTWARE/APPLICATIONS**
- ☐ 46. ☐ Network Management
- ☐ 47. ☐ Systems Management
- ☐ 48. ☐ Security
- ☐ 49. ☐ Communications Software
- ☐ 50. ☐ Terminal Emulation
- ☐ 51. ☐ Word Processing
- ☐ 52. ☐ Operating Systems
- ☐ 53. ☐ Client/Server Applications Development
- ☐ 54. ☐ Database Management/RDBMS
- ☐ 55. ☐ Spreadsheet
- ☐ 56. ☐ Groupware
- ☐ 57. ☐ EDI
- ☐ 58. ☐ E-mail
- ☐ 59. ☐ Windows/Graphical User Interface
- ☐ 60. ☐ Multimedia
- ☐ 61. ☐ Graphics/DTP
- ☐ 62. ☐ Remote Access
- ☐ 63. ☐ Imaging
- ☐ 64. ☐ Suites
- ☐ 65. ☐ Middleware
- ☐ 66. ☐ Document Management
- ☐ 67. ☐ Database Server
- ☐ 68. ☐ Site Metering Tools
- ☐ 69. ☐ Computer-Integrated Telephony (CIT)

A B
- ☐ 106 ☐ **WIDE-AREA NETWORK EQUIPMENT & SERVICES**
- ☐ 70. ☐ Frame Relay Equip./Services
- ☐ 71. ☐ Modems
- ☐ 72. ☐ FT-1/T-1/T-3 Multiplexers
- ☐ 73. ☐ FT-1/T-1/T-3 Services
- ☐ 74. ☐ SONET
- ☐ 75. ☐ Inverse Multiplexers
- ☐ 76. ☐ SMDS
- ☐ 77. ☐ Asynchronous Transfer Mode
- ☐ 78. ☐ Diagnostic/Test Equipment
- ☐ 79. ☐ DSU/CSU
- ☐ 80. ☐ VSAT/Satellite
- ☐ 81. ☐ ISDN Equipment & Services
- ☐ 82. ☐ PBXs
- ☐ 83. ☐ Voice Mail/Response
- ☐ 84. ☐ Videoconferencing
- ☐ 85. ☐ Leased Lines
- ☐ 86. ☐ Switched Data
- ☐ 87. ☐ E-mail/On-line Services
- ☐ 88. ☐ 800/900/MTS Services
- ☐ 89. ☐ Virtual Networks
- ☐ 90. ☐ Outsourcing/Systems Integration Services
- ☐ 91. ☐ Education/Training Services

- ☐ 92. ☐ None of the above (1-91)

6 What is the total number of LANs, workstations/nodes at this location/ in your organization?

At this location:			Entire organization:		
	LANs	Workstations/ Nodes		LANs	Workstations/ Nodes
1. ☐	5,000+	☐	1. ☐	5,000+	☐
2. ☐	1,000 - 4,999	☐	2. ☐	1,000 - 4,999	☐
3. ☐	100 - 999	☐	3. ☐	100 - 999	☐
4. ☐	50 - 99	☐	4. ☐	50 - 99	☐
5. ☐	10 - 49	☐	5. ☐	10 - 49	☐
6. ☐	1 - 9	☐	6. ☐	1 - 9	☐

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:
B. The following network platforms are planned for purchase:

A B
- ☐ 55 ☐ **NETWORK ARCHITECTURES**
- ☐ 01. ☐ SNA
- ☐ 02. ☐ DECnet
- ☐ 03. ☐ TCP/IP
- ☐ 04. ☐ Novell IPX/SPX
- ☐ 05. ☐ APPC/APPN/LU 6.2
- ☐ 06. ☐ NETBIOS
- ☐ 07. ☐ AppleTalk
- ☐ 08. ☐ NFS
- ☐ 09. ☐ Other *(please specify)*__________

A B
- ☐ 56 ☐ **NETWORK OPERATING SYSTEM**
- ☐ 10. ☐ Microsoft (LAN Manager)
- ☐ 11. ☐ Novell (NetWare 2.X, 3.X)
- ☐ 12. ☐ Novell (NetWare 4.X)
- ☐ 13. ☐ Windows NT
- ☐ 14. ☐ Windows NT/Advanced Server
- ☐ 15. ☐ LocalTalk (AppleTalk)
- ☐ 16. ☐ Banyan (VINES)
- ☐ 17. ☐ IBM (LAN Server)
- ☐ 18. ☐ IBM (PC LAN Program)
- ☐ 19. ☐ Artisoft (LANtastic)
- ☐ 20. ☐ Digital (Pathworks)
- ☐ 21. ☐ Other *(please specify)*__________

A B
- ☐ 57 ☐ **LAN ENVIRONMENT**
- ☐ 22. ☐ 4M Token Ring
- ☐ 23. ☐ 16M Token Ring
- ☐ 24. ☐ Ethernet
- ☐ 25. ☐ 100M Ethernet
- ☐ 26. ☐ StarLAN
- ☐ 27. ☐ FDDI
- ☐ 28. ☐ LocalTalk
- ☐ 29. ☐ 10Base-T
- ☐ 30. ☐ ATM
- ☐ 31. ☐ Other *(please specify)*__________

A B
- ☐ 58 ☐ **COMPUTER OPERATING SYSTEM**
- ☐ 32. ☐ DOS
- ☐ 33. ☐ Unix/Xenix/AIX
- ☐ 34. ☐ OS/2
- ☐ 35. ☐ OS/2 Warp
- ☐ 36. ☐ IBM MVS
- ☐ 37. ☐ IBM VM
- ☐ 38. ☐ Digital VMS
- ☐ 39. ☐ Macintosh
- ☐ 40. ☐ Windows
- ☐ 41. ☐ Windows 95
- ☐ 42. ☐ X Window System
- ☐ 43. ☐ Solaris
- ☐ 44. ☐ Other *(please specify)*__________

- ☐ 45. ☐ None of the above (1-44)

8 For which areas outside of North America do you have purchase influence? (check all that apply)

- 1. ☐ Europe
- 2. ☐ Asia
- 3. ☐ South America
- 4. ☐ Australia
- 5. ☐ Middle East
- 6. ☐ None

9 Do you have or plan to install client/server networks? ☐ Yes ☐ No

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

	Mainframes			Minis	
	A – Installed	B – Planned		C – Installed	D – Planned
1. IBM	☐	☐	1. IBM	☐	☐
2. Amdahl	☐	☐	2. Digital	☐	☐
3. Cray	☐	☐	3. Tandem	☐	☐
4. Hitachi	☐	☐	4. Unisys	☐	☐
5. Unisys	☐	☐	5. AT&T GIS	☐	☐
			6. HP	☐	☐
			7. Data General	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ONLY)

	At this location:		Entire organization:	
	E – Servers	F – Clients/Nodes	G – Servers	H – Clients/Nodes
1. Power PC				
2. Power Macintosh				
3. Macintosh (Other)				
4. Pentium-based				
5. 80486-based				
6. 80386-based				
7. 80286-based				
8. RISC-based workstations				
9. Other				

11 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

- 01. ☐ $100 million or more
- 02. ☐ $50 million - $99.9 million
- 03. ☐ $25 million - $49.9 million
- 04. ☐ $20 million - $24.9 million
- 05. ☐ $10 million - $19.9 million
- 06. ☐ $5 million - $9.9 million
- 07. ☐ $1 million - $4.9 million
- 08. ☐ $500,000 - $999,999
- 09. ☐ $250,000 - $499,999
- 10. ☐ $249,999 or less
- 11. ☐ None of the above

12 Estimated gross annual revenue of your entire company/institution: (check one only)

- 1. ☐ $10 billion or more
- 2. ☐ $1 billion to $9.9 billion
- 3. ☐ $500 million to $999.9 million
- 4. ☐ $100 million to $499.9 million
- 5. ☐ $50 million to $99.9 million
- 6. ☐ $10 million to $49.9 million
- 7. ☐ $5 million to $9.9 million
- 8. ☐ $4.9 million or less
- 9. ☐ None of the above

13 Estimated number of employees at this location/in entire organization:

At this location:
- 1. ☐ Over 10,000
- 2. ☐ 5,000 - 9,999
- 3. ☐ 2,500 - 4,999
- 4. ☐ 1,000 - 2,499
- 5. ☐ 500 - 999
- 6. ☐ 499 or less

Entire organization:
- 1. ☐ Over 10,000
- 2. ☐ 5,000 - 9,999
- 3. ☐ 2,500 - 4,999
- 4. ☐ 1,000 - 2,499
- 5. ☐ 500 - 999
- 6. ☐ 499 or less

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Simon says no to Web hate sites

Wiesenthal Center asks 'Net service providers, universities to restrict offensive Web sites.

FOLLOW UP

By Doug Barney

The Simon Wiesenthal Center hopes to stop hate groups dead in their electronic tracks.

The Jewish human rights organization last week began sending out letters to some 2,000 Internet service providers and 1,900 universities asking them to refuse to support World-Wide Web sites that promote bigotry and racism. But while sympathetic, Internet providers said they do not like the idea of judging and restricting content.

Network World last week reported on the center's plans in an article that prompted a nationwide flurry of coverage and debate (*NW*, Jan. 8, page 1). The day the article appeared, the center was flooded with calls about its intended course of action.

The organization is now formally seeking to establish a code of ethics under which providers and universities will refuse sites that "promote violence and mayhem, denigrate and threaten minorities and women, and promote homophobia."

The center is hoping to avoid the "c" word.

"This is not an issue of censorship. There are at least 50,000 ways to get up into cyberspace. It is a wake-up call to the industry," argued Rabbi Abraham Cooper, associate dean for The Simon Wiesenthal Center. "There is a vast middle ground which can be developed where First Amendment rights are protected and the community is also thought of."

CompuServe immediately reacted, saying the place to start is with those that "create the content," rather than with those that simply provide access to it.

Rabbi Abraham Cooper *says his argument is "not an issue of censorship."*

Other service providers agreed.

"We certainly do not advocate this type of information. At the same time, we walk that fine line of being a business entity. We make our network available to any and all users, without discrimination," said Brian Muys, manager of corporate communications for PSINet, Inc. in Herndon, Va.

One provider, who requested anonymity, has had requests from customers to cancel the accounts of those promoting and selling racist materials. "I would like for them to be gone, but I am afraid of being sued," the provider said. "They behave by the rules, and people have a right to say what they want."

Country codes

In the U.S., it is difficult to restrict these activities due to strong protection of the First Amendment right of free speech.

But in other democratic countries, such as Canada and Germany, speech is not so protected.

Ernst Zundel, a Canadian Holocaust revisionist, set his Zundelsite up in the U.S. to avoid Canadian laws that ban the promotion of hate. "I never bothered to try to start my site in Canada. The situation here is much more repressive [than in the U.S.]," Zundel said.

Cooper has met with both German and Canadian officials in an attempt to get them to enforce existing laws against hate speech.

NET-OPHYTES

Some hate groups are clearly new to the 'Net. One group's telephone hot line boasted of its 'Net address, but instead of saying "dot," as 'Net afficionados do, the speaker said "period."

Web vigilantes

Sometimes the Web can turn on itself. Hackers brought down the Nation of Islam home page after the famous Million Man March. And if you use Lycos to query on "WAR," you will come across a number of dummy pages, including one that argues that White Aryan Resistance is what occurs when an electrical current is passed through an Aryan body.

And there are various sites, such as The Hall of Shame, that cast a sarcastic eye toward hate sites. The site includes "a list of URLs made by fascists, fanatics, fundamentalists, con-men, hypocrites, profiteers and all-round net.cooks (sic)."

The Hall of Shame believes that exposing hate is better than restricting it. As the Shame home page explains, "The best way to deal with fascists is to pull them out into the light. Point out the weak points in their logic, and let everyone see how silly they are. Laughter is more powerful than guns, at least when dealing with ideas."

CompuServe agrees. "Restricting access doesn't make those things go away. By promoting a free exchange of ideas, what typically happens is the truth gets out. When somebody posts something outrageous or false on the Internet, it typically gets corrected pretty quickly," said William Giles, corporate spokesman for CompuServe, Inc.

One observer said that there is something about the Web itself that causes this activity.

"Free speech means something different on the 'Net. Maybe it is because of the anonymity," speculated Mark Gibbs, a noted Internet expert. "I guess the world is a lot less civilized than we think it is." ■

Tandem goes for face-lift with help from new leader

By Ben Heskett

Cupertino, Calif.

According to new Tandem Computers, Inc. President Roel Pieper, the $2.2 billion company has an identity crisis — and he has to fix it.

Pieper, who was named president last week, said Tandem would like to bury its proprietary image and hop on the open systems, client/server bandwagon. To that end, the company will leverage its proprietary Himalaya server architecture by building key aspects into its line of Integrity boxes, which are designed for the Unix space.

Another big step is Tandem's recent agreement to share its ServerNet technology with Compaq Computer Corp. — a move designed to gain a foothold in the Windows NT market. The two companies together will push for the ServerNet architecture to be a Windows NT industry standard. Similar results are expected through an agreement with NEC Technologies, Inc.

ServerNet is a new server architecture featuring speedy internal packet-switching routers instead of a bus-based architecture. Because the architecture does not rely on a processor for every path through which data can flow, information takes the shortest route possible. That means the high-end architecture can improve on throughput speeds in Unix and Windows NT boxes.

Tandem's *Pieper says a key focus of the firm's new strategy will be its NonStop Kernel software.*

Pieper, who arrives after a stint as president of Tandem subsidiary UB Networks, Inc., last week said another center of Tandem's strategy is its NonStop Kernel (NSK) software, which runs on its Himalaya line. The NSK fault-tolerant technology will soon be available for Unix and NT, Pieper said.

All of these moves should help Tandem's cloudy image.

"The company is in a position where it is technology rich and maybe image poor," Pieper admitted.

With a long history in on-line transaction processing, Tandem has been strong in markets such as banking, retail and telecommunications.

Pieper said the firm would expand into electronic commerce and decision support to restyle itself as a versatile player. ■

Melinda Le Baron and Skip MacAskill say change could be good for UB. See page 28.

MAXM, Boole & Babbage upgrade management tools

By Jim Duffy

Two network and systems management vendors last week unveiled upgraded products that are easier to implement and give customers control over a wider array of devices.

MAXM Systems Corp. unwrapped a new edition of MAX/Enterprise, which works better with other management systems and includes features to ease data collection, sharing and reporting.

Separately, rival Boole & Babbage, Inc. rolled out Ensign R3, which lets companies manage NetWare and Windows NT servers and features enhanced automation.

Analysts said the products address ease-of-use issues users have had to grapple with in the past. "A lot of the cost of these products is in the implementation. And that's where [MAXM and Boole & Babbage] are focusing here," said Chris Byrnes, program director at META Group, Inc. in Westport, Conn.

MAXM has introduced a feature called MAX/Open that makes it easier to integrate its MAX/Enterprise 3.3 management system for legacy mainframe environments with third-party Simple Network Management Protocol management platforms, such as Hewlett-Packard Co.'s OpenView or IBM's NetView for AIX.

MAX/Open is an object-oriented interface that sends alarms from MAX/Enterprise. These show up on an SNMP-based management system console as icons.

Analysts said the products address ease-of-use issues users have had to grapple with in the past.

MAX/Enterprise also now runs on a variety of Unix servers and clients as well as on Windows NT clients. Release 3.3 is the first version to run on clients other than OS/2 and servers other than AIX, said Pam Casale, MAXM vice president of marketing.

This portability hits home with users.

"We are under tremendous pressure internally to make the jump to Microsoft," said Tennis Smith, automation engineer at Visa International, Inc. in San Mateo, Calif. "We'll be moving a lot of functionality over to [the Windows NT client] as well as limited functionality to the Windows workstation, so

See **Management tools,** *page 16*

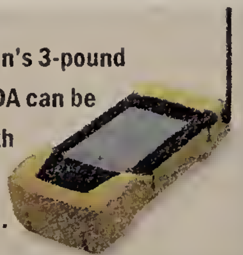
Wireless nets

Digital cellular makes mark at trade shows

By Joanie Wexler

A slew of digital cellular devices and network services made their debut at last week's Consumer Electronics Show (CES) and MacWorld Expo conference, presenting customers with a wider range of mobile data capabilities, but also raising interoperability concerns.

Products and services based on GSM, Time Division Multiple Access (TDMA) and Narrowband Advanced Mobile Phone System (AMPS) — an analog technology that supports digital-like features — emerged from companies such as Digital Ocean, Inc., Ericsson GE, Nokia Mobile Phones, Inc. and Pacific Bell Mobile Services.


Digital Ocean's 3-pound Seahorse PDA can be outfitted with six network connections.

GSM and TDMA are circuit-switched digital "standards" on which forthcoming personal communications services (PCS) will be based. The trouble with having multiple PCS technologies is that networks and equipment based on different technologies will not necessarily work together. This creates a pickle for customers requiring the ability to roam across regions where different digital technologies are used.

The situation created by PCS license holders building networks with different technologies "is still very confused. I haven't seen it addressed," said Tim Schmidt, the principal of Encore Consulting Group, Inc. in Longwood, Fla.

But the situation drew closer with the following moves:

■ Digital Ocean launched at MacWorld a semirugged handheld computer dubbed the Seahorse. The Personal Digital Assistant runs on Apple Computer, Inc.'s Newton operating system and has an optional module for connecting to GSM nets.

The module also has an infrared port and a connection to the Global Positioning System. A Cellular Digital Packet Data or a spread-spectrum wireless LAN modem is built into the Seahorse motherboard. In addition, the device has a PC Card slot for another modem or function card.

With either the motherboard modem or the clamp-on module, the Seahorse costs about $2,000; with both, the product costs about $500 more, a company spokeswoman said.

■ Nokia Mobile Phones introduced a data-ready telephone at CES with a 16-line display that supports short messaging over the AMPS network. Some analysts said the arrival of AMPS services, such as short messaging, fax and asynchronous data service, could stall the use of digital wireless nets.

■ Ericsson GE unveiled at CES a TDMA phone based on the U.S. IS-136 standard and featuring integrated alphanumeric paging. AT&T Wireless Services already offers TDMA net services in about 97% of its 105 markets, and TDMA is the net choice of Southwestern Bell Mobile Systems and BellSouth Cellular Corp.

■ Pacific Bell Mobile demonstrated at CES its GSM service, still a year away from commercial availability.

Pacific Bell Mobile plans to put roaming agreements in place with other carriers building GSM nets, including BellSouth Personal Communications, American Personal Communications, American Portable Telecom, Intercel, Omnipoint and Western Wireless. The relationships will extend GSM coverage to about 130 million people.

In areas where there isn't GSM coverage, users will be able to default to the analog cellular network via dual-mode phones.

The primary reason for digital cellular networks is to increase capacity and accommodate more users.

Some carrier officials have said that users who do not jump to the digital network soon are headed for a big busy signal on the analog net.

But interoperability worries and other factors might keep customers away.

"I prefer the AMPS network to the digital net," said Jonathan Cohen, principal at Computer Ability, Inc., a reseller in Englewood, N.J. "The sound quality [with digital] is inferior, and we've found the reliability to be slightly worse." ■

Web testing tool on the way

By John Cox

Sunnyvale, Calif.

Mercury Interactive Corp. will soon launch a beta version of a tool designed to test how Web server applications perform.

Programmers building Web applications today need to create their own test tools or use low-level programming utilities.

What's missing are automated software programs that can systematically test interactions between Web browsers and constantly changing Web servers, and also simulate the unpredictable, heavy loads that threaten to swamp these servers.

The new product, WebTest, will be an extension to Mercury's existing test tools, letting them handle the HTML messages used in Web browser-to-server interactions.

Mercury's WinRunner and Xrunner record keystrokes of graphical user interface applications and generate test scripts. The company's LoadRunner tool simulates the impact of different numbers of users on the application's performance and creates reports of the results.

WebTest will let WinRunner and Xrunner record the browser interactions, which can be used to verify that the server application's links are intact or that bit maps are accurate, according to Zohar Gilad, Mercury's director of enterprise product marketing.

WebTest with LoadRunner will let developers multiply these interactions for hundreds of users and measure the results.

This type of capability is just what's needed, according to Jason Olim, president of CDnow, Inc., an on-line music store based in Penllyn, Pa. The company's Web application has 100,000 lines of C code and programmers are making changes daily. But currently, they have to run all their changes through custom-written tests. Other than WebTest, Olim knows of no tools that tests the entire application systematically.

The load testing is also vital to CDnow, Olim said, because the company is constantly uncovering bottlenecks and then, in reaction, beefing up different parts of the system.

"I want to be able to correlate the system activity reports we get with known application behaviors," Olim said. "Then I can see the impact of the behavior on the system and figure out whether I need to buy more RAM or improve the I/O."

WebTest will be available in March as a $195 extension to existing Mercury products. Within the year, Mercury plans to deliver a separate testing tool aimed at Web-only developers.

© Mercury (408) 523-9900.

Product profile:	Mercury Interactive's WebTest
Description:	An extension to Mercury's existing line of automated software testing tools that lets Web developers systematically test Web application functions. It also lets developers simulate how a Web server will perform when accessed by hundreds or thousands of end users equipped with Web browsers.
How it works:	Records keystrokes of browser user, generating test scripts which can then be run automatically.
Availability:	March
Price:	$195 in addition to the cost of Mercury's test products, which range from $495 to $995.

Oracle unveils plan for family of Internet devices

Web terminal, video phone and two-way pager among products being developed.

By Elinor Mills

Redwood City, Calif.

Oracle Corp. is planning a family of Internet appliances — including a World-Wide Web terminal, video phone and two-way pager — which might use different microprocessors but will share a common network computer operating system.

The company is talking to other firms about codevelopment of technology to be used in the devices and to hardware companies interested in licensing that technology, said Andrew Laursen, Oracle's vice president of network computing.

Laursen confirmed an agreement with Acorn Computer Group Plc. in Cambridge, England, on the development of reference designs for a range of network computer products. He refused to say what other companies Oracle is talking with.

"The Network Computer will use pieces of the RISC operating system, but what we're doing is we're building a multimedia operating system and we're calling it NC-OS," Laursen said.

Users will not see a Windows- or Macintosh-type interface, but there will be a browser.

"When you turn on this box, you will be launched into what we're calling the Internet desktop," he said. "It's your browser, E-mail and word processing, and all that functionality is rolled into one interface."

Once a reference design is ready, Laursen said, Oracle will license it "to anybody who wants to license it."

The first device to be marketed will be an Internet terminal for consumers. It will "essentially be a small footprint box" with a number of network connectors on it, Laursen said.

"It will have a network connector for Ethernet, which gives you cable modems and corporate LANs, and it will support high-speed modems," he said. "It will connect to a TV set or a super VGA monitor. You can connect in a keyboard and a mouse directly or through infrared."

The device will come with a small LCD screen, if the manufacturer can include one and maintain the $500 street price.

In terms of connection speed, Laursen said, "I would argue 28.8K bit/sec isn't fast enough to surf the Internet, but this thing will work as well as any net appliance works at 28.8."

In addition to browsing the Web, creating documents and sending and receiving electronic mail, users will be able to print from the device and store data on the network.

Oracle is looking to unveil a prototype of the Network Computer before the end of March, Laursen said. The devices are expected to ship by year-end.

"When you turn on this box, you will be launched into what we're calling the Internet desktop."

Mills is an IDG News Service correspondent in San Mateo, Calif.

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InSoft unveils tools for 'Net

By Carol Sliwa

Mechanicsburg, Pa.

InSoft, Inc. last week introduced a series of audio, video and data collaboration products — some of which could be packaged with leading Web browsers if the company has its way.

One InSoft official acknowledged that the company has been in touch with several Internet product and service companies, including Netscape Communications Corp., Spyglass, Inc., UUNET Technologies, Inc. and the Hunt Group, but no product integration agreements have been solidified.

"We're moving toward more tightly integrated solutions with leading Internet companies, but we also believe there is a market for these applications standalone," said Keith Wimberly, InSoft's director of marketing.

The company's CoolTalk multimedia software will allow PC users with 14.4K or 28.8K bit/sec modems to simultaneously view data via a shared whiteboard, exchange real-time messages via a chat tool or literally speak with each other via TCP/IP links. The product supports Microsoft Sound System–compatible audio boards.

Another new software offering, dubbed CoolView, gives end users all the functionality of CoolTalk, plus the ability to see each other in real time. It runs on PCs equipped with a 28.8K bit/sec modem and a Video-for-Windows-compliant video capture card.

InSoft is also releasing ICEMaker, a new tool for building multimedia applications that can run over the Internet or a corporate intranet. These applications could work in conjunction with CoolTalk and CoolView, or run separately.

Going a step further

Taking interactive communications a step further, InSoft also plans to release an Internet Communications Server, which will bring telephone-like switching capabilities, such as call-transfer, hold, add/drop and conference calling to corporate Web sites. The product will work in conjunction with CoolTalk or CoolView.

For example, a stockholder wanting information from a broker could check the brokerage firm's Web site and then interact with the broker through video, audio or data exchange.

"It certainly could be interesting to have dial-up meeting capability," said David Yockelson, vice president of Advanced Information Management Strategies with the Stamford, Conn.-based consultancy META Group, Inc.

"For companies already spending a lot of money putting marketing and sales information onto the Web, it provides some interesting added-value applications," he said.

But Yockelson said he cannot envision end users splurging for CoolTalk or CoolView to get such capabilities. If the products are bundled into Internet-related software or PCs, they could have a greater chance of success, he said.

© InSoft: (717) 730-9501.

InSoft unleashes flurry of multimedia products

Product	Cost	Availability
CoolTalk audio/data collaboration tool	$49.95 for 14.4K bit/sec version; $69.95 for 28.8K bit/sec version	Now for Windows 95; February for Solaris, HP-UX and Windows 3.1
CoolView videoconferencing tool	$149.95	Feb. 12
ICEMaker development toolkit	$795.99	February
Internet Communications Server	$2,995	Third quarter

COMMENTS?

See "How to reach us" on page 6.

NetworkWorld
TECHNICAL SEMINARS

"Switching and VLANs will reshape the enterprise, and network managers need to learn more about these technologies."
John Gallant, Editor-in-Chief, Network World

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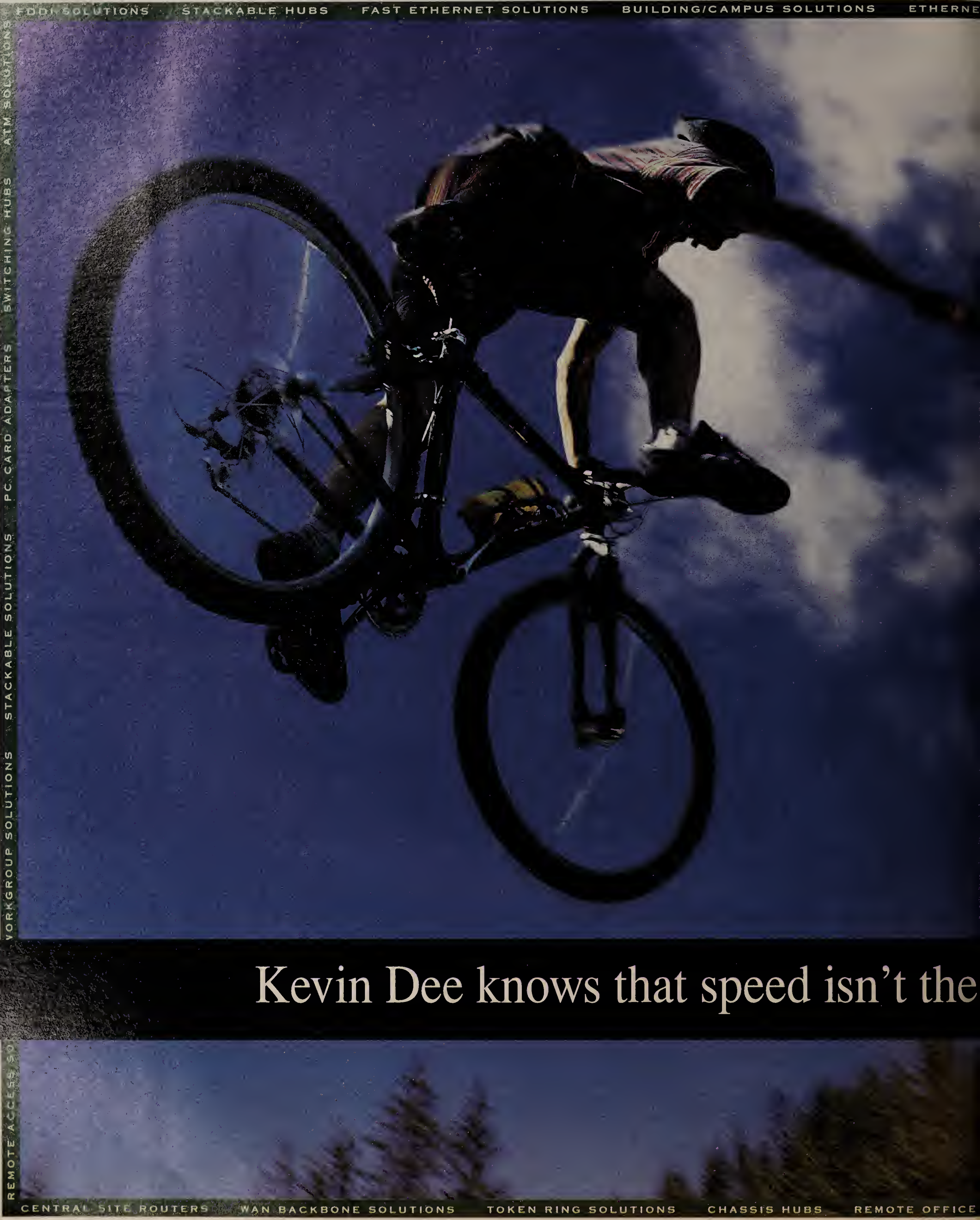

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Management tools

Continued from page 9

[the portability is] really useful."

Other Version 3.3 features include:

- MAX/Report, which allows net managers to measure application availability through detailed reports on events and alarms.
- MAX/Build, a library of rule sets that translates event messages from disparate networking gear into a common event language.

MAX/Enterprise 3.3 starts at $75,000, and MAX/Open starts at $15,000. Both are available now. MAX/Report is priced at $500, and MAX/Build costs $12,000. They will be available later this month and in February, respectively. Visionary costs $1,500 and will be available later this month.

Raising Ensign

Boole & Babbage extended its management system, Ensign R3, to include intelligent agents for configuring and managing NetWare and Windows NT servers from a common interface. Previously, server management was restricted to Unix machines. Ensign R3 sports an integrated console that correlates color-coded alarms to specific server and application problems.

Other features include 50 software modules for automating system fixes and interoperability with leading trouble-ticketing, software distribution and job scheduling applications from Remedy Corp., Tangram Enterprise Solutions, Inc. and Operations Contol Systems.

Ensign R3 will ship later this quarter for $5,000.

☎ MAXM: (800) 393-6296; Boole & Babbage: (800) 544-2152.

Management maneuvers

MAXM's MAX/Enterprise 3.3 features:

- ▶ Integration with leading SNMP platforms
- ▶ Automated operation status reporting
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Boole & Babbage's Ensign R3 features:

- ▶ Intelligent agents for NetWare and Windows NT
- ▶ Integrated alarm and system administration console
- ▶ 50 system automation modules
- ▶ Support for third-party scheduling, trouble-ticketing and software distribution applications

Firm to bridge OLTP/warehouse gap

By Barb Cole

Menlo Park, Calif.

A small software firm here will soon begin beta-testing a suite of tools aimed at designing and maintaining data warehouses that reach across corporate nets.

Informatica Corp.'s as yet unnamed tool set is expected to include a data warehousing design tool, a facility for extracting data from databases and client/server applications, plus a set of scheduling and management utilities.

The tools will be sold in an integrated suite and will enable users to more closely synchronize data in operational systems with information stored in warehouses by regularly culling data from existing applications, sources said.

The company confirmed the plan but would not provide product specifics.

"We are trying to minimize coding and give administrators easy-to-use graphical tools for moving data into the warehouse and performing other administrative tasks," said Paul Albright, director of marketing at Informatica. "[Users] have to be able to implement a warehouse without five database administrators."

Albright said the tools have been in development for more than two years. They have been written from the ground up in C++ to run on client/server nets. He said the tools would work in concert with existing databases and front-end analysis tools. The data extraction tools in place today are often custom-written mainframe applications or packaged applications that have been ported from the mainframe and require COBOL programming.

In addition, users have, for the most part, refrained from distributing data warehouses because of the lack of remote management tools. Users familiar with the plan said the Informatica tools may be useful in constructing more dynamic data warehouses.

"As applications like SAP [R/3] become standard, it is no longer just a question of wanting to get data out of the centralized mainframe," said Warren Thornthwaite, managing partner at Infodynamics, llc., a data warehousing consultancy here. Instead, administrators want to move data into and out of the warehouse from existing applications and databases, he said.

Albright said the tools will run on Windows front ends, and on Unix and Windows NT servers. The software is expected to ship this year. ■

Company:	Informatica Corp.
Based:	Menlo Park, Calif.
Founded:	1993
Employees:	30
Financials:	Privately held; the company received several million dollars in venture funding last October
Primary product:	OpenBridge data extraction software
Key competitors:	Prism Solutions, Evolutionary Technologies, Carelton

Cabletron

Continued from page 1

The offering will complement Cabletron's existing and planned token-ring switch products at the workgroup and wiring-closet levels.

Cabletron is among just a handful of vendors — Centillion Networks, Inc., now part of Bay Networks, Inc., IBM and Madge Networks, Inc. — shipping token-ring switches. But analysts expect the market to become crowded later this year as more companies look to help customers break bandwidth bottlenecks with dedicated 4M and 16M bit/sec links.

Getting SmartSwitch

Like its existing Ethernet and FDDI SmartSwitch cards, Cabletron's token-ring module will attach to the MMAC-Plus' 2G bit/sec Internal Network Bus and support the company's SecureFast Virtual Networking capabilities.

The module — which will support source route transparent bridging — will be based on Cabletron's next-generation SmartSwitch Application Specific Integrated Circuit technology.

The token-ring switch module will support per-port Remote Monitoring, which makes it possible to collect network trend and analysis statistics from a central protocol analyzer. The switch can be managed using local management tools or remotely controlled through any Simple Network Management Protocol-compliant program.

Although Cabletron's bread and butter is the Ethernet market, about 35% of its installed base uses token-ring technology. The company posted about $220 million in pure token-ring sales in fiscal 1995, according to Travis.

Skip MacAskill, senior research analyst at Gartner Group, Inc. in Burlington, Mass., said Cabletron's presence in the token-ring switching market is good news for customers.

"With the traditional Ethernet players like Cabletron and 3Com getting into token-ring switching, it's an indication that token-ring switching is really going to breathe some life back into the token-ring market itself," he said. "This means more variety for the huge installed base of IBM true-Blue shops."

The token-ring switching module for the MMAC-Plus will be out in the second half of this year. Pricing has not been set.

Workgroups and wiring closets

Cabletron will attack the token-ring switching market from the low end with its 16-port stand-alone TSX-1620 switch, a product it sells under an OEM agreement with Nashoba Networks, Inc.

For mid-range customers, Cabletron will offer two choices: the EliteSwitch/1, which it gained through the recent acquisition of Standard Microsystems Corp., and a token-ring switch module for its MMAC hub.

☎ Cabletron: (603) 332-9400.

CABLETRON'S TOKEN-RING SWITCHING TIERS

Workgroup:

- ▶ TSX-1620 16-port stand-alone switch from Nashoba Networks

Wiring closet:

- ▶ Multiport module to come for the MMAC eight-slot switching hub
- ▶ Four-port module for the EliteSwitch/1 five-slot switching hub from Standard Microsystems

Backbone:

- ▶ Up to a 20-port module for the MMAC-Plus 14-slot switching hub

ISDN

Continued from page 1

It was also a feather in the cap of Intel Corp., which is on a crusade to snuff out what some are calling an ISDN suicide mission by several regional Bell operating companies such as Pacific Bell, which are also trying to raise rates.

It was Intel's petition, granted by the Washington commission, that halted the US WEST hike. But the issue may reemerge once the public has been given due notice and evaluates the impact.

Defending US WEST's position, the company's director of circuit-switched services, Scott Berman, said the triple-price hike is aimed at the 2% of US WEST ISDN customers that want unlimited usage — meaning they want to use the ISDN link like a dedicated line.

But Intel and other computer makers have customers with high-bandwidth applications — such as Intel's ProShare videoconferencing system — that require the 128K bit/sec speed of ISDN. Higher ISDN prices could affect sales of the PCs running those applications.

"It may be more of a selfish thing by Intel," said Eric Paulak, an analyst at Gartner Group, Inc. "Anything that protects ISDN costs and availability promotes ProShare," Intel's ISDN videoconferencing product.

It looks like Intel's work has just begun: Pacific Bell just last month filed tariffs that would double its per-minute usage charges and put a cap on free weekend usage. It could take up to six months to get a ruling on that filing.

Intel has allies. The California ISDN Users Group has sent a letter to the California State Public Utilities Commission to block the Pacific Bell rate hikes, said Bob Larribeau, director of the user group and principal of Larribeau Associates, a San Francisco consulting firm.

He said Pacific Bell told the group that its service delivery costs were higher than originally anticipated. "But we think their costs are high because they are running the network inefficiently. We're appealing to the commission to work with PacBell to improve [operations]," he said.

Others agree it's nervy for the RBOCs to demand higher prices, given that ISDN technology has struggled for well over a decade to become a service and has only recently become widely available. The rate hike filings are a "kamikaze action on the part of the RBOCs because they're facing the onslaught of cable modems and other telephone technology" for important big-bandwidth applications such as telecommuting and Internet access, said James Bryce, a member of the Texas ISDN Users Group. ■

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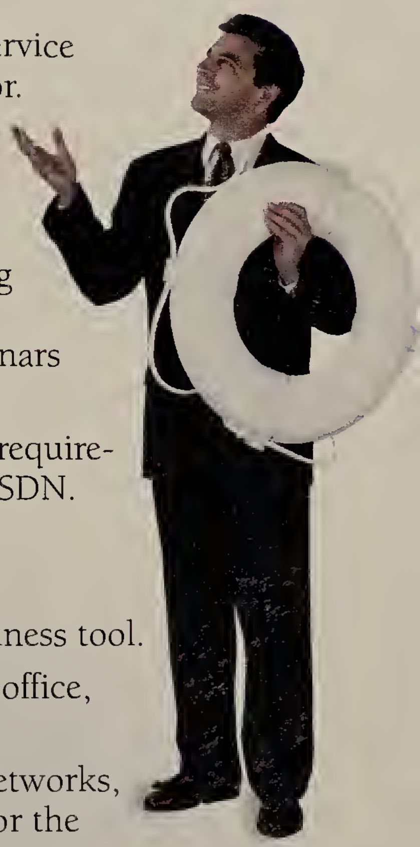

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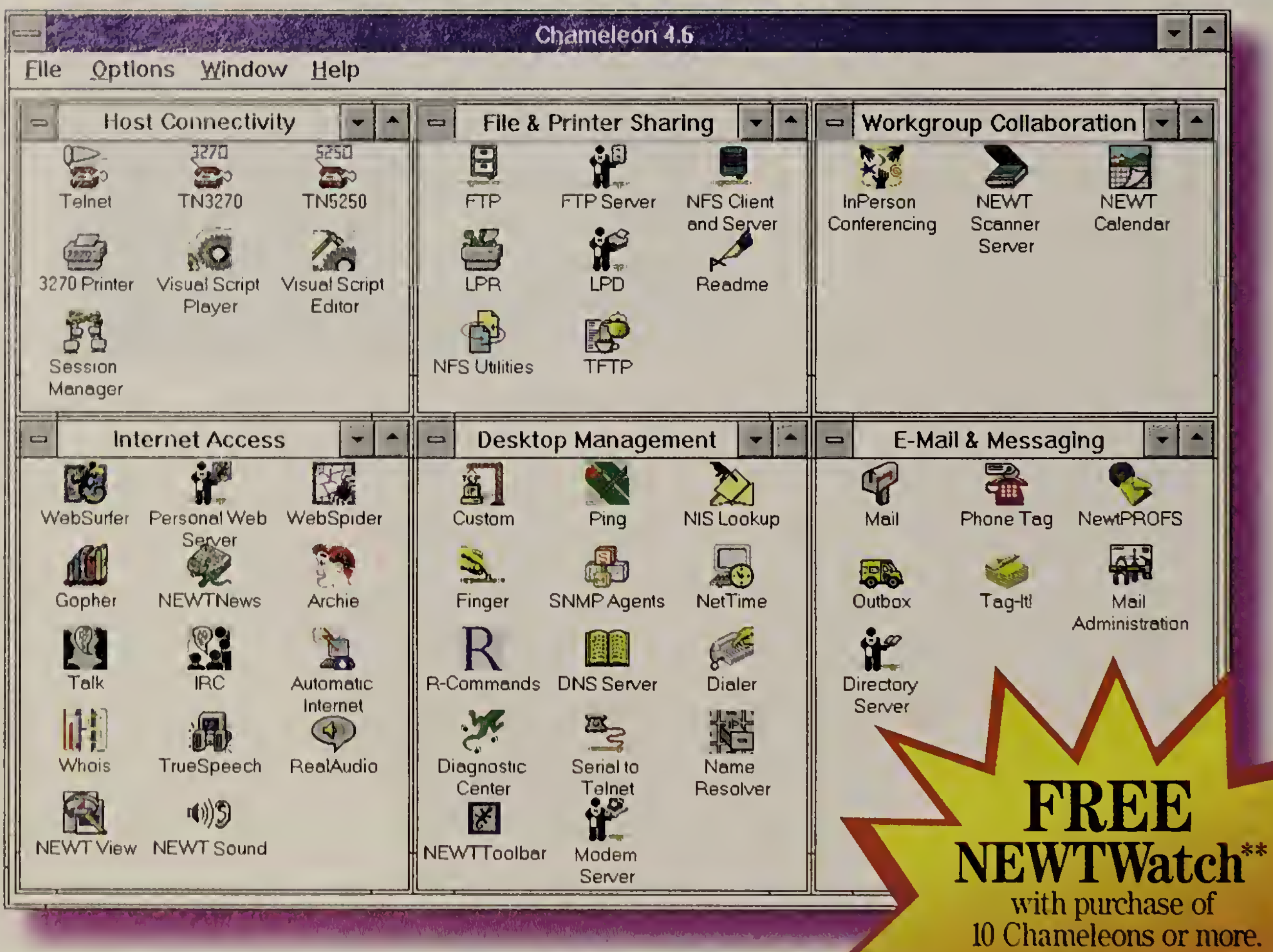

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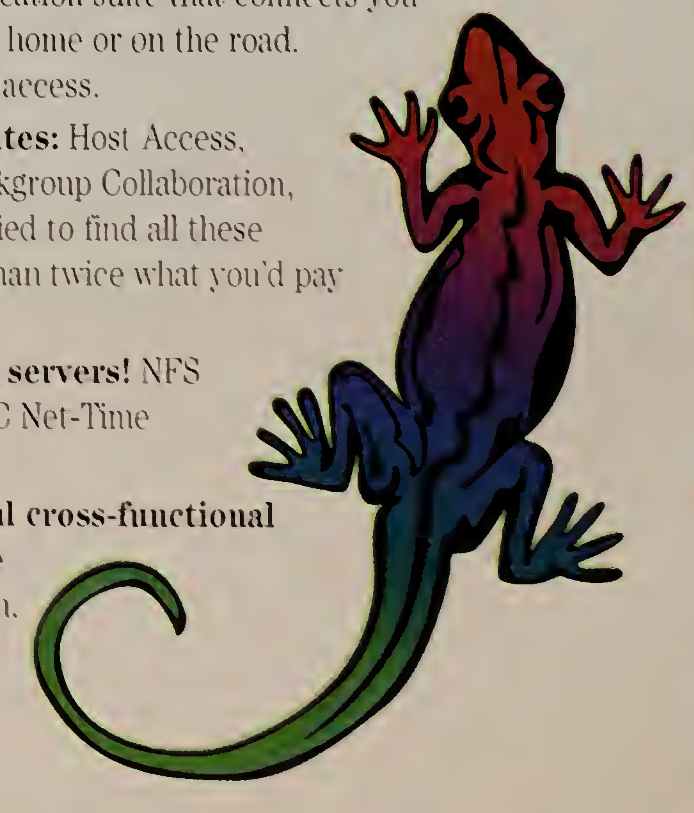

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Briefs

■ **MCI Communications Corp.** *said it is testing frame relay access for* **electronic data interchange.** *The service will enable MCI's HyperStream frame relay customers to connect directly to MCI's EDI*Net network with a single additional permanent virtual circuit.*

■ *For branch office users needing access to TCP/IP resources on the mainframe,* **Hypercom, Inc.** *last week added a TCP/IP gateway to its Integrated Enterprise Network hybrid router family. The Legacy/TCP/IP Gateway takes any non-TCP/IP protocols and converts them into a LAN-based Logical Link Control 2 format to establish* **direct links with TCP/IP-based host applications.** *The gateway will be available later this month.*

Pricing was not available.

Hypercom: (602) 548-2120.

■ *The* **Mobile Management Task Force (MMTF)** *last week said it has come up with a set of management parameters for mobile computer users. These* **Management Information Bases (MIB)** *can be used as extensions to the Simple Network Management Protocol standards, according to the MMTF.*

The MIBs define objects that address administration issues specific to different aspects of mobile computing. They enable developers to create SNMP-compliant net management applications customized for mobile computing.

Copies of the MIBs are available from the MMTF World-Wide Web site at http://www.cpi-logue.com/mmtf.

■ **Ascend Communications, Inc.** *last week announced that it has set up a new videoconferencing business unit. The* **Multimedia Access Products** *unit will be headed by Roger Boyce, who formerly worked at AT&T in advanced image processing. The unit will focus on multimedia access to the Internet.*

Ascend: (800) 621-9578.

Down-to-earth pricing for Jupiter FRAD

By Michael Cooney
Waltham, Mass

Jupiter Technology Corp. this week will jump headfirst into the SNA/frame relay access fray with a line of full-function, low-priced devices that set a new price/performance standard for the market, the company claimed.

Jupiter will announce the Voyager family of multiprotocol frame relay access devices (FRAD). The FRADs are designed to give users guaranteed delivery of SNA traffic from remote branch offices linked via frame relay nets. At the same time, the product line allows customers to more easily control bandwidth, prioritize mixed LAN and SNA traffic, and ensure the performance of mission-critical applications on frame relay nets, the company said.

"We are featuring sophisticated congestion control mecha-

See Jupiter, *page 22*

Design tool tests WAN architectures

Defense contractor assembles carrier, hardware database for WAN modeling.

By David Rohde
Washington, D.C.

COMNET PREVIEW

A government contractor has developed a WAN design tool that weighs the demands of particular user applications against hardware and service options, instead of merely assessing the cost of connecting physical nodes.

The NetworkVUE software suite from GRC International, Inc. is the newest entry in the field of network design. The system proposes WAN architectures and then evaluates the trade-off between network reliability and cost.

NetworkVUE, which will be unveiled at the ComNet '96 show here later this month, evolved from GRC's work designing networks for the Department of Defense. The product utilizes a rules-based expert system to rank proposed network designs based on user inputs of proposed WANs or the expansion of existing WANs.

The key to NetworkVUE's potential is its ability to generate inquiries and responses at the application layer of the seven-layer network model, allowing users to specify their traffic in qualitative terms such as electronic mail or transaction processing.

This top-down approach generates a more accurate and flexible network design than tools that simply prompt for proposed network locations and estimated traffic, said Carlton Rice, a consultant who designed NetworkVUE for GRC.

Corporate network managers frequently can state the number of characters in a typical E-mail message or transaction document, Rice explained, "but they may not have an idea of what that translates into in terms of packets at the lower layers."

Since overhead is added as originating data moves down through the network model, the NetworkVUE simulator adds the appropriate overhead based on the proposed WAN protocols, such as frame relay or X.25, or LAN delivery methods, such as Ethernet datagrams.

This also means that network managers can input endpoint-to-endpoint requirements that are meaningful to their users — such as the availability of an application, acceptable bit error rates or acceptable response time — instead of allowing the model to define a more sterile performance standard from machine to machine.

"The response time is not 'this node' to 'that node'; it's person-to-person or person-to-host," Rice said.

To price-out the proposed network designs, NetworkVUE consults a built-in relational database of carrier rates and hardware prices (see graphic).

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Raw data for your net design

NetworkVUE's database is used to design WANs. It also contains rates for all principal local exchange carriers and five interexchange carriers, plus product specifications, performance data and prices for eight hardware vendors.

Interexchange carriers:

- AT&T
- Cable & Wireless
- MCI
- Sprint
- LDDS WorldCom

Hardware vendors:

- Ascom Timeplex
- Bay
- Cascade
- Cisco
- Network Equipment Technologies
- Netrix
- Nortel
- StrataCom

Performance data for hardware vendors includes bit error rates, availability, throughput/bandwidth and maximum speeds.

Frame relay

Airline embraces net standards

By Joanie Wexler
Rolling Meadows, Ill.

Apollo Travel Services is looking to its network to keep its lifeblood business — bookings by the nation's travel agencies — aloft.

To get a service edge with the agencies, Apollo is dumping its private, multidrop network for an AT&T InterSpan frame relay service carrying IP traffic.

Apollo is a computer reservation system (CRS) jointly owned by United Air Lines, Inc., USAir, Inc. and Air Canada. The main goal of the new network is to speed up travel agent connections into the CRS for booking airline, hotel, car rental, vacation and other travel-related activities, said Tom O'Key, vice president and chief information officer at Apollo Travel Services here.

IP allows for remote diagnostics, file transfers, structured data and load balancing at the host site, he said. O'Key indicated that these IP features contribute to overall enhanced network performance.

The proprietary Air Line Control (ALC) protocol that formerly traversed Apollo's WAN does not offer these features, he explained. ALC is a decades-old protocol in place in most CRSs.

Last fall, the company began the network cutover with about 1,000 agencies. The new net has reduced the former 2- to 4-second response times for travel agents tapping into the Apollo CRS to under 2 seconds, O'Key said.

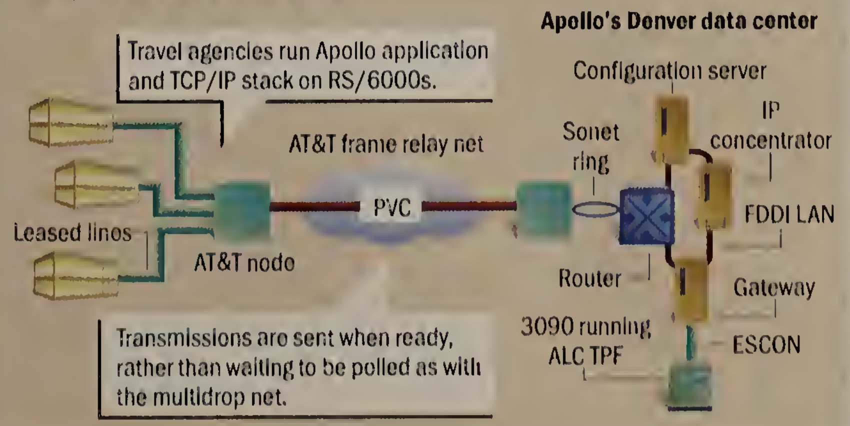
"If we don't go this fast, [the travel agencies] will go to the other guy," he said.

The tack has begun to pay off.

See Airline, *page 22*

Apollo net blasts off

IP running over AT&T's public frame relay service is replacing ALC-over-multidrop lines to give travel agencies more functions, faster response and an incentive to use Apollo as their exclusive CRS.


Apollo's Denver data center
Travel agencies run Apollo application and TCP/IP stack on RS/6000s.
AT&T frame relay net
PVC
Leased lines
AT&T node
Configuration server
Sonet ring
IP concentrator
FDDI LAN
Router
Gateway
3090 running ALC TPF
ESCON
Transmissions are sent when ready, rather than waiting to be polled as with the multidrop net.

Jupiter

Continued from page 21

nisms in our software that ensure maximum bandwidth utilization that safeguards SNA/APPN traffic from being discarded by the frame relay net," said Bill Kwan, chief technology officer and vice president of software development at Jupiter.

Typically, low-end FRADs do not have the priority and bandwidth control mechanisms found in high-end FRADs, analysts said.

Jupiter's *Kwan says his software offers top bandwidth control mechanisms.*

But technology is not the central theme of the company's announcement.

"The key to the Voyager announcement is that Jupiter has cut the price/performance curve of FRADs by 50%, and users can now get a full-function FRAD for the price they budgeted previously for entry-level devices," said Anura Guruge, an independent analyst based in New Ipswich, N.H.

The Voyager family consists of four Motorola, Inc. processor-based devices: the token-ring FRAD (tFRAD), the Ethernet FRAD (eFRAD), a serial FRAD (kFRAD) and the host FRAD (hFRAD).

Positioned as entry-level SNA/LAN connectivity devices, the tFRAD and eFRAD come with one LAN port and four wide-area ports capable of supporting speeds up to 2M bit/sec.

The tFRAD starts at $1,695, and eFRAD prices start at $1,495.

Similarly configured FRADs from Sync Research, for example, can cost anywhere from $2,495 for an Ethernet FRAD to more than $6,000 for a token-ring device, Kwan claimed.

The kFRAD supports a single 128K bit/sec WAN port and three synchronous or asynchronous ports. The kFRAD is designed for remote branch applications where there are no LANs present, such as with automated teller machines.

Jupiter's kFRAD starts at $1,095.

The hFRAD is a host site concentration device capable of linking large numbers of workstations with host resources. The hFRAD supports up to seven LANs and 127 serial ports. On the WAN side, it can link up to 13 2M bit/sec frame relay links.

Prices for the hFRAD begin at $15,995.

The Voyager family supports a slew of protocols, from bisynchronous and asynchronous and other features such as Synchronous Data Link Control to Logical Link Control 2 conversion, so users can terminate that traffic locally and keep it off the backbone. In addition, the devices support TCP/IP's Routing Information Protocol and IPX routing protocols for sending LAN traffic over the frame relay service.

"Users can set bandwidth allocations for individual applications as they deem necessary," Kwan said.

The Voyager line of FRADs will be available in February.

©Jupiter: (617) 894-9300.

AT&T fields new Interchange

By Joanie Wexler

Cambridge, Mass.

The recently announced shift of AT&T's Business Network on-line service from the carrier's proprietary Interchange platform to the World-Wide Web could go far in broadening the service's appeal.

AT&T said early this month that it will phase out the Interchange technology platform on which the Business Network rides by the end of 1996 in favor of the Web (*NW*, Jan. 8, page 6).

The move will give users consistent interfaces, formats and commands across the AT&T service and other Web services. This would eliminate the need for proprietary Interchange client software on user desks, said Michael Kolowich, president of AT&T New Media Services, the fledgling AT&T division that runs the Business Network.

Kolowich said the platform switch accommodates the millions of users "who would rather see the world through a Web browser" such as Netscape Communications Corp.'s Navigator.

Analysts said it also represents AT&T's acceptance of reality: that the Web — not a proprietary AT&T on-line platform — is where the action is.

NetworkWorld Fusion

While AT&T is scrapping Interchange in favor of the Internet, competitor CompuServe is taking a hard look at on-line discussions. Link to sites and talk about on-line censorship. Select News+ then WANS & Internetworking.

According to analysts, the move is overdue. "The Web has been around for awhile; I don't understand why [AT&T] didn't do this a long time ago," said Amy Reiber, a broadband consultant with TeleChoice, Inc., a Verona, N.J.-based consulting firm.

Kolowich said all 2,500 existing Business Network content providers and others will be supported in the Web-based Business Network Version 2, which will be available midyear.

One advantage he cited is that users will have one portal to information from AT&T content providers such as Dow Jones Business Information Services, Dun & Bradstreet Information Services and Standard & Poor's.

Currently, he said, users get this information from multiple sources on the Web via multiple passwords and then get "nickled-and-dimed to death" by paying for them separately.

Interchange is one of several AT&T struggling ventures that might eventually find itself changed after AT&T's restructuring, which includes dividing into three companies and laying off 40,000 workers over the next three years. ■

Advertisement

What are the key criteria when selecting a LAN Emulation solution?

By George Prodan

LAN Emulation (LANE) is a way to let existing LAN protocols operate over an ATM network. This, in turn, allows LAN administrators to create virtual LANs (VLANs)—a logical association of users sharing a common broadcast domain.

What should you look for when selecting a LANE solution?

First, look for ATM Forum LANE v1.0 compliance. This specification defines multivendor LANE interoperability. Every ATM user should insist on ATM Forum compliant LANE. But there are other requirements to consider.

Look for a robust implementation. For example, a graphically-based VLAN Man-agement Application allows the administrator to add and delete individual computers from virtual LANs via a point-and-click interface, greatly simplifying system administration.

An intelligent Broadcast and Unknown Server (BUS) reduces unnecessary broadcast traffic. In a well-designed network, the LAN Emulation Services (LES) are tightly coupled, allowing the BUS to probe the LES cache to resolve unknown addresses without additional network utilization.

Virtual LAN (VLAN) Roaming is another important capability. This allows the network administrator to define virtual LANs without regard to physical location and without disrupting the logical framework of the network. The network administrator can move computers from place to place without reconfiguring the logical network.

Virtual LAN (VLAN) Browsing provides users with the added capability of choosing the virtual LANs in which they will participate from a window-based menu of potential VLAN choices.

Selecting an ATM LANE solution from a systems solution provider assures the user of plug-and-play interoperability across LANE components including switches, adapters and LAN access devices. A single vendor implementation is the best guarantee of a smooth installation, with multivendor interoperability providing a back-up in the vendor selection process.

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Circle Reader Service #40

Airline

Continued from page 21

The American Automobile Association (AAA) made a corporate decision last spring to go with the Apollo system as its exclusive CRS partner, largely because of its network direction, said Joe Calkins, manager of CRS relations at AAA.

Houston, we have liftoff

The California State Automobile Association (CSAA), a AAA member, piloted the new Apollo net last fall. Mike Caplin, CSAA's manager of travel service, said Apollo response times are 2 seconds or less, compared with 4- to 5-second response times on WorldSpan, the competing ALC-based CRS the association previously used. The multidrop network ran at speeds of up to 9.6K bit/sec, while the frame relay permanent virtual circuits (PVC) connect travel agents across the AT&T net at 16K bit/sec committed information rates with bursting potential up to 56K bit/sec, explained Jerry Krause, Apollo's director of network services.

Improvements in net response time are often a function of simply adding bandwidth rather than changing protocols — particularly since connectionless protocols such as TCP and IP are overhead-heavy. But Krause pointed out that compared to the "whopping overhead" in the old ALC protocol, IP is quite slim and fast.

Compatibility issues

One issue the group faced is that ALC and IP are inherently incompatible. To blend them, O'Key's group developed translation software that runs on a RISC System/6000 front-ending the 3090 mainframes. The group also developed what they christened the IP Concentrator, which consolidates IP sessions from multiple AT&T nodes throughout the country into groups. So, if there is a failure, "each session does not have to be re-stored individually," saving time, Krause said.

According to O'Key, Apollo went with a public frame relay service instead of running frame relay over its existing leased-line network because "we want to be able to move to [Asynchronous Transfer Mode] or whatever the latest thing is."

Using the service allows customers the luxury of piggybacking on the carrier's up-to-date technology, which it can afford to change often because of its economies of scale, he said. ■

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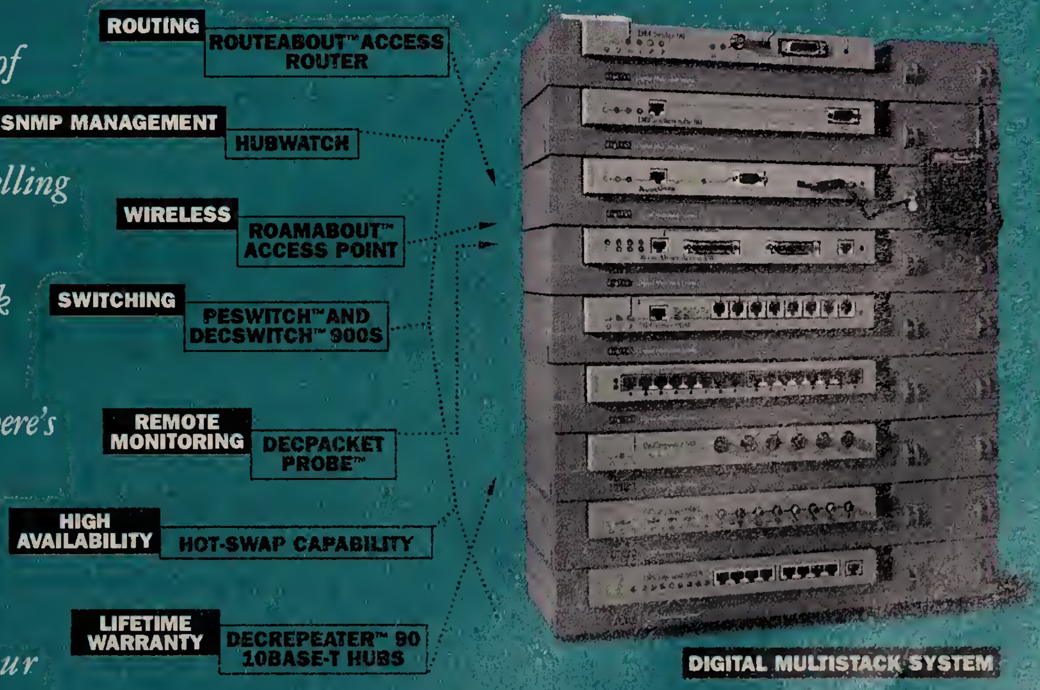

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Circle Reader Service #43

INTERNETWORKING MONITOR

Daniel Briere and Christine Heckart

Problems implementing/reimplementing frame relay

If you've looked for new wheels lately, dealers selling cars with passenger-side air bags probably told you hair-raising tales to show the importance of these devices in protecting your loved ones from harm. But dealers with cars lacking this feature might have argued that you can't place a baby's car seat in front of an air bag and that passenger-side bags can cause harm to your smaller loved ones. And they probably asked, "Wouldn't you rather put the savings in the college fund anyway?"

When you begin evaluating carrier frame relay services — or try rebidding an existing network — you'll find the same type of problem, even after all these years. Each carrier sells to its own strengths, and it is hard to get a clear-cut and comparable answer on specific points — still.

The CIR can mean something different with each carrier. The PVCs may be defined in a simplex or duplex manner. And policies and recommendations on oversubscription of the port vary widely.

Another problem is that there are still few, if any, good automated tools for frame relay network design. The design process is still mostly educated guesswork. Every carrier's design will be different and will seek to maximize the advantages of that carrier's service offering, making apples-to-apples comparisons difficult.

These designs stick close to the carriers' experience, too. It is far easier if you choose equipment that your chosen carrier is familiar with, and the carriers let you know this. Of course, this equipment isn't always the most cost-effective or appropriate for your applications, but it will make the implementation process a whole lot faster and easier.

Problems continue after a carrier is chosen. For instance, troubleshooting problems during the implementation phase is still more art than science.

The first step is usually to blame the problem on the local loop and send out a person to test the line. By the time the network is fully operational, you'll know what college his kids go to, how long he's been married, how the new puppy peed on the new white sofa, and so forth.

The second step is to send out an equipment test person. Unfortunately, you probably know more about configuring the equipment than this representative does. In fairness, the carriers are good at taking responsibility for managing the troubleshooting process until the problem is resolved. It may just take a few tries.

Some protocols still don't work well with frame relay. IP is not a problem; and with the correct software upgrades, IPX is also a good choice. But without the IPX packet burst mode and large packet size network loadable modules, you may find your coffee moldy before completing a remote file transfer. SNA over frame relay is best supported by RFC 1490, but not all equipment offers this option.

Overhead is also something else to look out for. We recently asked one client what he did across the network at night given that utilization stayed over 30%. The response was, "Considering we have no off-hour users and do backup locally, I guess we transmit protocol overhead." We suggest sticking with update only, routing protocols where possible.

Whether you are putting in a network for the first time or rebidding a network, you need to constantly look out for hidden issues. You have a few choices to help you along the way. The book *The Guide To Frame Relay Networking*, available at 1-800-LIBRARY, gives implementation tips about these issues and many more.

If you're at ComNet in Washington, D.C. on Jan. 31, you can attend our Frame Relay Implementation session at 1:15 p.m.

Briere is president and Heckart is director of broadband with TeleChoice, Inc., a consultancy in Verona, N.J. They can be reached at danny_briere@telechoice.com or christine_heckart @telechoice.com.

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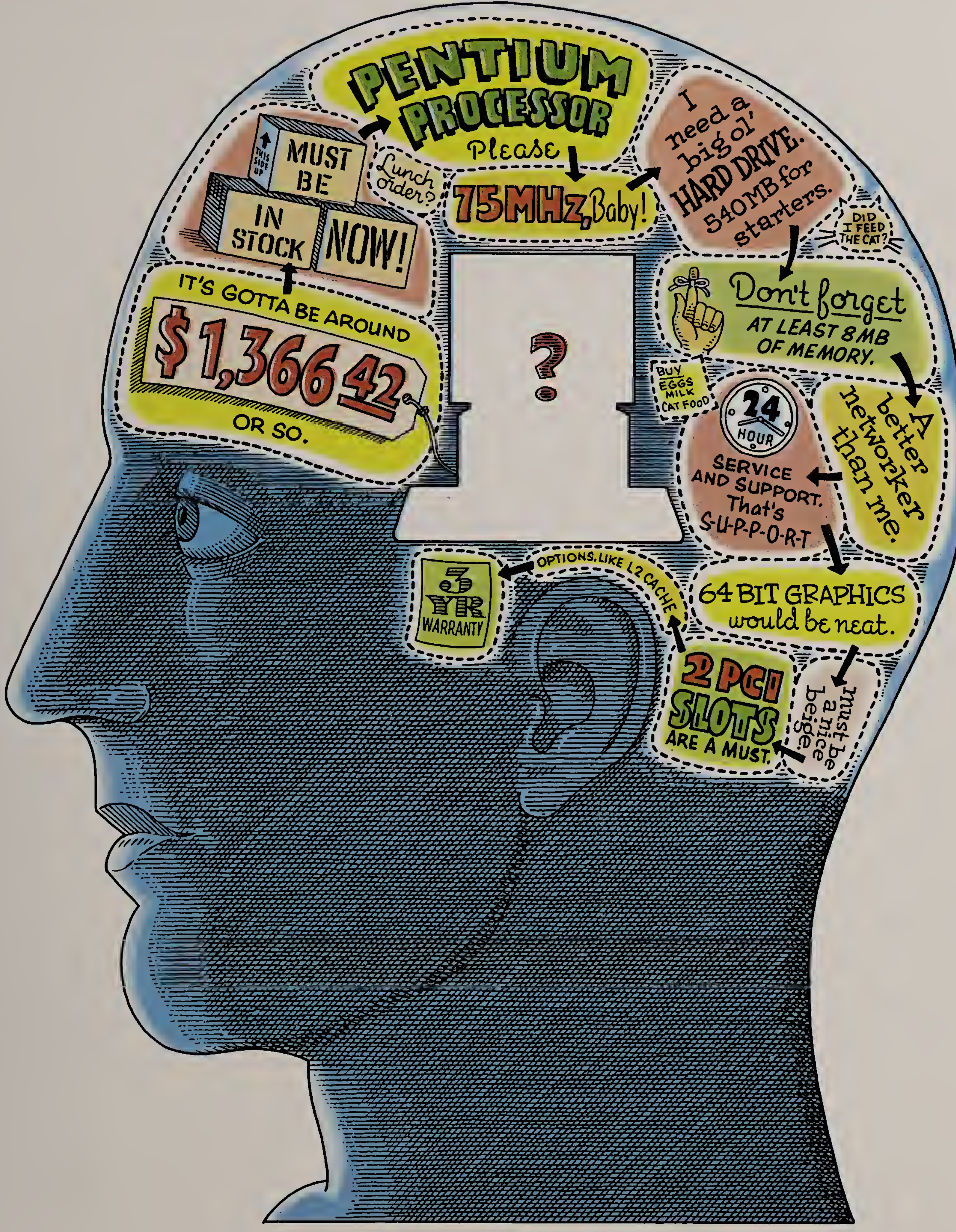
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{ The decision-making process }

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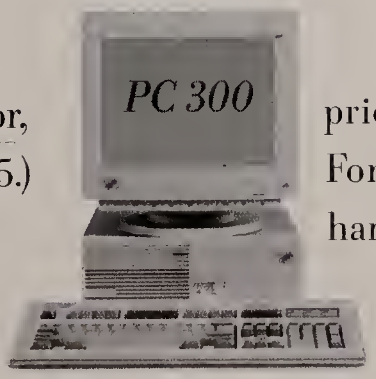

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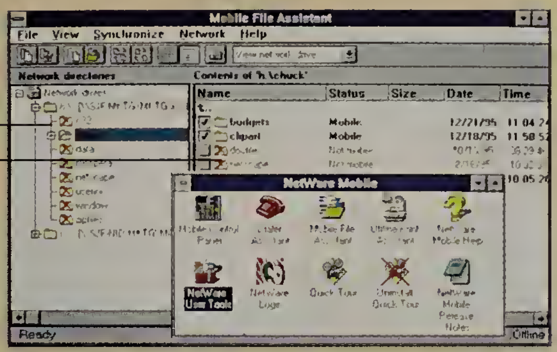


The software's File Assistant gives users on the road the same view of network drives they get in the office.

File Assistant copies selected files to remote users' laptops, then synchronizes changes with files on the server when users reconnect.

New version of NetWare helps companies hit the road moving

By Kevin Fogarty

Orem, Utah

Novell, Inc. last week announced NetWare client software that will give users on the road the same view of their network files that they have in the office.

NetWare Mobile, a Virtual Loadable Module-based client for Windows 3.1 machines, is designed to make life easier for end users who travel often. The software, first reported on by *Network World* last August, will let end users work on networked files whether they are connected to the net directly, over a dial-up line or even disconnected.

NetWare Mobile lets end users copy files from the server to their laptops, work on the files while they are disconnected from the network, then copy any changes in the files back to the server when they reestablish a network connection.

"It's really good at synchronizing users who are connected to the network and users that are not on the network," said Derrick DeCarlo, vice president of operations at network design consultancy SafeNET, Inc. in Atlanta.

DeCarlo, who beta-tested the product, plans to put all of SafeNET's estimated 100 mobile workers on NetWare Mobile.

One of the product's utilities lets end users establish profiles telling the client how to call the home network from places the user often works.

A "hotel" profile, for example, would include credit card information for long-distance calls and would limit the amount of file synchronization to be done over slow modem connections. A "remote office" profile might include the names and locations of printers in a branch office, and would tell the client to load the drivers it needs for that location.

The client also supports NetWare Directory Services, which allows users to log on from anywhere in a NetWare 4.X network and access files on their home servers.

The product, which is scheduled to ship this month, contains the client component of Novell's NetWare Connect remote access product. It can connect to NetWare networks that run the server portion of NetWare Con-

See **NetWare Mobile,** *page 28*

Case study

Software firm finds a future in fast Ethernet

By Jodi Cohen

Marina del Rey, Calif.

Dan Sweeney is living a network engineer's dream: He has designed a high-speed LAN without having to worry about upgrading from an installed net.

When his firm recently moved into a new headquarters building here, it only made sense that Sweeney design the net around the most advanced technologies available — switching and fast Ethernet. He left behind the limitations of a shared 10M bit/sec Ethernet at the firm's old headquarters.

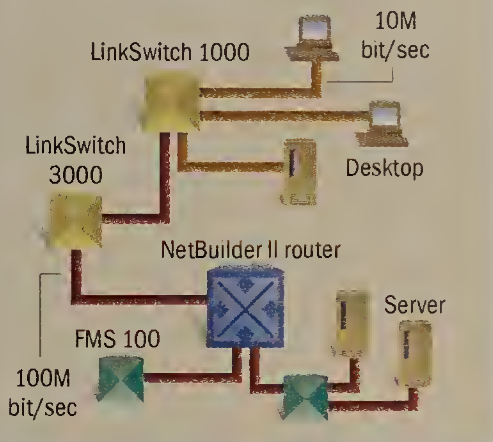
Sweeney, net operations manager at Quarterdeck Corp., installed 3Com Corp. LinkSwitch 1000 Ethernet switches and LinkBuilder FMS 100 fast Ethernet hubs. Also, he is beta-testing the LinkSwitch 3000 100M bit/sec switch, which he plans to deploy once 3Com finishes the product.

The network, which provides 10M bit/sec switched Ethernet links to the desktop and 100M bit/sec shared Ethernet server and backbone connections,

See **Fast Ethernet,** *page 28*

LAY OF THE LAN

Quarterdeck is using 3Com's LinkBuilder FMS 100 shared fast Ethernet hubs to provide 100M bit/sec backbone and server link. For 10M bit/sec desktop connections, the company is using the LinkSwitch 1000 Ethernet switch. Quarterdeck will soon replace the shared FMS 100s with dedicated 100M bit/sec LinkSwitch 3000s and relocate the hubs to provide power users with 100M bit/sec links.



LAN monitoring firms merge

By Ben Heskett

Campbell, Calif.

Technically Elite Concepts, Inc. (TEC) and Network Application Technology (NAT), two companies with a long history of working together, recently merged to form a company offering both remote monitoring hardware and software.

The new company, Technically Elite, Inc., claims to be the second-largest network monitoring company in the world next to Hewlett-Packard Co. It will offer NAT's network monitoring software and TEC's hardware-based LAN probes separately and in integrated packages, said Richard Wixted, vice president of marketing for Technically Elite and founder and former president of TEC.

The product family will be compliant with the Simple Network Management Protocol-based Remote Monitoring (RMON) standards. Since TEC's hardware works with the new RMON2 standard and NAT's does not, the new company will scrap NAT's hardware.

NAT's MeterWare can run as a stand-alone product or work with HP's OpenView, IBM's NetView and SunSoft, Inc.'s SunNet Manager platforms. The software allows network managers to monitor net equipment such as hubs.

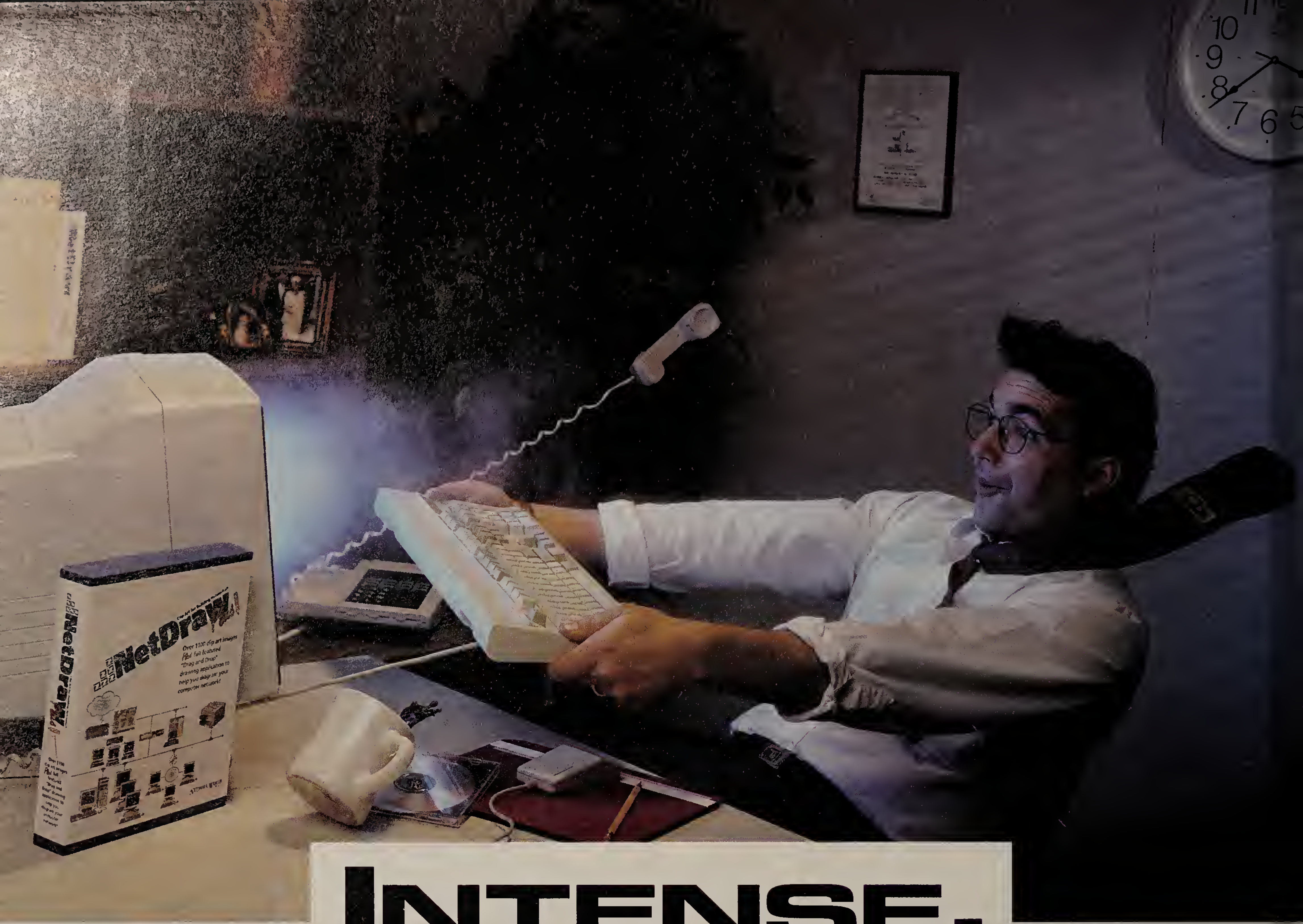
The software complements TEC's hardware, which has been built into hubs from vendors such as HP.

John McConnell, president of Boulder, Colo.-based McConnell Consulting, Inc., said the merger has the potential to result in a powerful line of management products that feature support for rules-based management and RMON standards.

The new company will introduce an FDDI monitoring tool at the end of this month and has plans to make Asynchronous Transfer Mode and fast Ethernet management-related OEM agreements later in the year. ■

TECHNICALLY ELITE, INC. COMBINES TWO COMPANIES

Company:	Network Application Technology	Technically Elite Concepts
Primary business:	Provides network monitoring tools	Provides multiport monitoring probes for Ethernet, token-ring and FDDI LANs
Primary products:	MeterWare for Windows and Unix	RMONplus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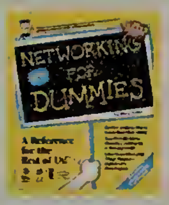

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CONNECT with Rockwell

Fast Ethernet

Continued from page 25

gives Quarterdeck the performance it needs to run such bandwidth-intensive applications as Lotus Development Corp.'s Notes and a customer database called Onyx. The network supports 760 end users.

"It was a nightmare trying to keep our database up and running in our old [shared Ethernet] net," Sweeney said. "That's why I turned to switching."

Although Sweeney was impressed by the increased performance of switched and fast Ethernet, the technologies present new blind spots when it comes to net management.

"Trying to troubleshoot switched networks is very difficult," he said. "There aren't a lot of tools out there yet, and even the existing tools are time-consuming and hard to deal with."

But Sweeney is doing the best he can with 3Com's Transcend network management platform, which provides him with most of the information he needs about the switches and hubs in his network. Still, the data can be difficult to get at, he said.

Managing the shared fast Ethernet side of the net is particularly difficult, he said. Unlike the 3Com switching products, which offer Simple Network Management Protocol and Remote Monitoring capabilities, Sweeney said the 100M bit/sec hub does not have built-in management that can feed statistics to a program like Transcend.

Sweeney is anxiously awaiting a 100M bit/sec LAN analyzer to compensate for the lack of built-in management tools. He recommended that net managers set port-level thresholds and then redirect any errors to another port on the hub, which can be monitored with a LAN analyzer.

One tip he has for others looking to install switched Ethernet is to watch the net's end-to-end length. Although the technical limit for Ethernet is 205 meters for a single collision domain, many users such as Sweeney are tempted to push that limit to upward of 250 meters.

By extending the length of the LAN, net managers will have to contend with a greater number of errors, reflections and collisions, which will add to the complexity of troubleshooting a switched net, he said. ■

NetWare Mobile

Continued from page 25

nect, or to another communications server using either SLIP or PPP connections.

The software supports both IP and IPX across NetWare 3.X and 4.X networks. A later version of the client will run on Windows 95.

Pricing ranges from $129 for one user to $6,995 for 100 users.

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NetworkWorld Fusion

WIRED WINDOWS

Take control of your Windows 95 desktops

Many of my techie friends, while continuing to study Windows 95 in their labs, keep putting off the day when they will officially roll it out to their companies.

One of the reasons they'll give for this — but far down the list — is end-user support. What they really mean is: "I still haven't figured out how to control the desktop and protect users from themselves."

Dave Kearns

In the days before Windows and other GUIs, tools such as Novell, Inc.'s MENU and NMENU allowed the network administrator to lock the user into a structured DOS environment, running only company-approved applications.

Along came Windows 3.X — necessary because of the power of the applications it supported. Suddenly, users could redesign everything on their screen, install their own applications and — the real nightmare for support personnel — "help" their friends configure their systems.

Administrators found it was possible — with Windows stored on the network, read-only initialization (.INI) files, group files and some smoke and mirrors — to at least give the appearance of control. But this all came at the cost of odd error messages on users' screens generating support calls, as well as much time spent reconfiguring these files as users' needs changed.

Almost all of these problems were caused by Microsoft Corp.'s lack of recognition that in the corporate world, it's rarely the users who install, support or maintain the PC on their desks.

Well, hallelujah! Someone in Redmond finally had a revelation. There really are people whose job it is to set up and maintain end-user desktops.

Windows 95 lets administrators control as much of the end user's desktop as necessary — and all from the administrator's PC.

The best source for details on this information is the Windows 95 Resource Kit from Microsoft Press. But the Resource Kit help file (WRK95.HLP) is on the Windows 95 CD-ROM and contains enough information to get you started. What you want to read about is the System Policy Editor. With this tool, you can:

- Access and manipulate the Windows 95 Registry — the database of configuration information used by Windows 95 and Win 95 applications — on remote PCs.
- Create System Policies which overwrite all or part of an end user's registry when he logs on to the network.
- Create Group Policies, which are similar to NetWare 4.X's Profile Script. Group policies overwrite all or part of the registry for groups of users.
- Create User Policies tailored to the needs of individual users.

The important point here is that you can control only as much as you need to, whether that's just access to software or the total look and feel of the desktop. This also goes a long way toward solving the problem of the user who moves from desk to desk within the firm. Hardware configuration can be done locally at the machine, while user configuration can be handled from the net after logon.

What's the cost of all this? You're going to have to learn the Windows 95 Registry from top to bottom, but fortunately it's a job that can be done in small chunks.

NOTE: It was just brought to my attention that the E-mail address listed in December's Wired Windows columns was wrong. The correct address is listed below.

Kearns is a former network administrator and now is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

NET RESULTS

UB at crossroads as it restructures at the top

At a time when it's seeking to regain some momentum, UB Networks, Inc. has been forced to deal with a situation that is both a potential distraction and a priceless opportunity.

UB last week announced that Roel Pieper, its president and CEO, was resigning to assume the same posts at UB's parent company, Tandem Computers, Inc. Chris Brennan, UB's chief financial officer, will become the firm's president and chief operating officer.

Skip MacAskill and Melinda Le Baron

While part of Brennan's immediate promotion is intended to show that business at UB will continue without disruption, it's clear that more top-level moves need to be made. Almost all of Brennan's experience in the network industry has been on the financial side of the house, which means UB still needs an executive with a comprehensive grasp of the net market from both a technology and product level.

Even though Pieper brought UB's finances under some control after replacing Ralph Ungermann at the helm in 1993, the company had a tough time last year with nearly flat revenues and falling profits.

That was despite the company's product picture brightening with the arrival of key products such as the GeoLAN 500 switching hub. UB also has revamped its distribution strategy and spent a great deal of development time revising some of its network management initiatives, especially in the area of virtual LANs.

But a lack of in-house routing technology, questions about the direction of its LAN switching line and future Asynchronous Transfer Mode development, as well as an aggressive move into Internet-based products, have raised concerns in the industry and its customer base.

With Pieper leaving and presumably taking some key UB people with him for the ride, it will fall on Brennan and some as yet unnamed individuals to follow through on what Pieper started. This may present UB with a wonderful opportunity to reinvent itself and again become the dynamic, innovative firm it once was. A new team with some fresh ideas may help get UB focused on some critical networking areas where it can leverage its core competencies in high-end connectivity and net management, as well as maximize the use of its strategic partnerships.

So what does the future hold for UB? One scenario has Tandem selling off the hardware units of UB and essentially turning what's left into the net systems integration arm of Tandem. The problem with selling off UB is twofold: First, there are few corporations looking to acquire a large networking vendor. Second, what does UB have to offer — besides hub technology — that it can call its own?

Another scenario has the new team streamlining UB, making it a leaner, meaner competitor in the campus LAN marketplace. The problem is that UB still relies on several strategic partnerships for various technology and products, making aggressive, independent moves and quick reactions to changing market dynamics difficult.

The reality? It will likely be business as usually for UB during this executive transition as it continues to leverage existing and new product lines within its installed base, trying to keep its current customers satisfied.

Le Baron is a research director and MacAskill a senior research analyst in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached by E-mail at inquiry@gartner.com or by phone at (203) 316-1111.

Client/Server Applications

Covering: Databases • Messaging • Groupware
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Briefs

■ **Novasoft Systems, Inc.** *of Burlington, Mass., this week will announce NovaWeb, an* **Internet gateway** *for its NovaManage document management system. NovaWeb will let users access corporate documents stored in the document management system via World-Wide Web browsers. The server-based gateway includes a series of HTML search forms that allow users to identify documents by name, version and attribute. NovaWeb will be available this quarter for Windows NT and Unix. Pricing was not available.*

Novasoft: (617) 221-0300.

■ **Novell, Inc.** *last week announced a series of gateways for* **GroupWise** *designed to boost message throughput, reduce hardware requirements and simplify system management. The new gateways include ones for asynchronous communication, Simple Mail Transfer Protocol and X.400, as well as networks running IBM's OfficeVision/VM PROFS and Systems Network Architecture Distribution Services (SNADS). The gateways, which had run only on DOS, OS/2 or some Unix platforms, now run as NetWare Loadable Modules.*

Prices for the gateways are $495 for asynchronous communication; $2,995 for SMTP; $4,295 for X.400; and $9,995 each for OfficeVision/VM and SNADS.

Novell: (800) 861-2507.

■ **Conversion Sciences, Inc.** *is shipping conversion software and offering consulting services designed to speed the migration to* **SAP AG** *client/server applications. Conversion Sciences' Proteus converts legacy data to SAP's R/3 format, checking the data throughout the conversion for accuracy. Consulting costs $1,500 per day; the software costs $15,000 per conversion module.*

Conversion Sciences: (610) 687-1409.

Sybase digs in on apps development

Sybase subsidiary Powersoft attracts users with distributed version of PowerBuilder 5.0

By Barb Cole
Concord, Mass.

Beta testers say Powersoft Corp.'s PowerBuilder 5.0 will let them more easily distribute applications across a network.

The application development software, due for general release in the second quarter from the Sybase, Inc. subsidiary, is designed to let developers partition applications across clients and servers via Named Pipes, WinSock or Sybase's Open Server API.

''The distributed capabilities [of Version 5.0] are key to us,'' said beta-tester Tom Cervenka, an information systems consultant at the University of Illinois in Chicago.

''We're running into a jam due to the fact that we can't move SQL databases around. The ability to move pieces of code around will help us support more users.''

The tool supports a three-tiered approach to client/server application development, rather than the typical two-tier approach in which software runs on a front-end client that interacts with a back-end server. Under the three-tier approach, the user interface code runs on the client, while program logic is split between an application server and a database server. Among other things, this approach makes it easier to change just one part of an application without affecting the entire program, Cervenka said.

More new features

Version 5.0 also will feature an object repository and a compiler, which will make building applications faster and more portable.

''The biggest feature for us is the compiler,'' said beta-tester Chris Lundquist, systems analyst programmer with Pierce County Information Services in Tacoma, Wash. It will speed up the county's graphical applications, which tend to be sluggish, he added.

''I haven't done any benchmarks yet, but I can tell that the Windows come up quicker [with Version 5.0],'' he said.

Version 5.0's object repository will help in building cross-platform applications.

''We can develop an object class in Windows and use it in other environments,'' Lundquist said.

Powersoft plans to ship PowerBuilder for Unix in the first half of the year; a version for the Macintosh shipped last month.

While Version 5.0 will boost the distributed features of the popular tool, developers will have to wait for tighter integration between the software and middleware from Sybase that could provide even better distributed development capabilities.

Support for Sybase's Enterprise Message Services (EMS) and OmniSQL Gateway could come in Version 6.0 or in an earlier, incremental release, said Bill Bartow, product marketing manager at Powersoft.

While most users are looking forward to the new release as one that is enterprise-capable, some customers are more concerned with stability.

''[Powersoft] has a tendency to pump up the features and not really fix the bugs. I fear that this will be another example of overloading the product with features at the expense of stability,'' said Ron LeMaster, senior scientist at Bolder Heuristics, a consultancy in Boulder, Colo., that builds client/server applications for health care companies.

Powersoft officials acknowledged that stability has been an issue in the past and said that the company has taken steps to ensure less buggy code.

''This release should be more stable [than previous versions],'' said David Dewan, cofounder and vice president of technology at Powersoft. PowerBuilder 5.0 code was ''feature-frozen'' when it entered beta testing in December, a move designed to prevent untested features from making it into the final version, he said. ■

> **"The biggest feature for us is the compiled executables, which will result in significantly faster applications."**
> *Chris Lundquist, Pierce County Information Services*
>
> **"My hope is that Version 5.0 fixes many of the nasty bugs in PowerBuilder. I hope it fleshes out the object-oriented support, which right now is missing some key features."**
> *Ron LeMaster, Bolder Heuristics*
>
> **"Distributed PowerBuilder will be key. We're at the point where we have maxed out on the number of users we can support with the two-tier method."**
> *Tom Cervenka, University of Illinois*

Get MORE ON-LINE, including:

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From the main menu, select News+ then Client/Server Applications.

NetworkWorld *Fusion*

Sybase snaps up maker of reusable software objects for $28 million in stock

By John Cox
Concord, Mass.

Sybase, Inc. last week took steps toward becoming a supplier of reusable software objects that can be incorporated into client/server applications.

SYBASE

The company agreed to swap about $28 million worth of its stock to acquire Visual Components, Inc. (VCI), a small 2-year-old company that makes and sells a line of software components compatible with Microsoft Corp.'s Visual Basic Custom Control and OLE Custom Control (OCX) standards.

VCI's components

Developers building applications can easily incorporate these objects — such as a spell checker and spreadsheet — into their applications, instead of having to write their own, or license and integrate larger desktop applications such as Microsoft Excel. VCI's components currently include the Formula One spreadsheet, First Impression business graphics and VisualWriter text processor.

VCI will become a key part of a newly formed components division in Sybase's Powersoft Corp. subsidiary.

That division's goal is to build an array of reusable software objects that, via the OLE standard, can be used with many other tool sets besides Powersoft's PowerBuilder client/server development environment.

''Powersoft, as a tools provider, sees [component software] as the next major productivity gain for developers,'' said John Gannon, the division's general manager.

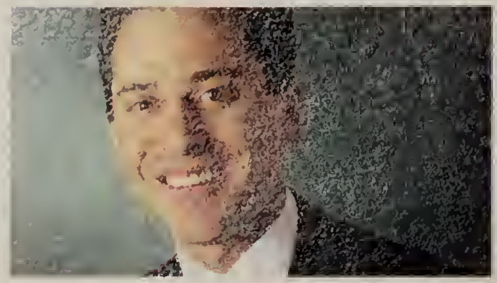
Powersoft will distribute these products via CD-ROM catalogs, telephone sales and the Internet, charging onetime prices ranging from $99 to about $500, depending on the functions and sophistication of each component. No run-time fees will be charged for embedding the component in an application and then distributing it to hundreds or thousands of desktop clients.

Last year, Powersoft began selling a package of VCI's spell checker and spreadsheet objects that had been specially adapted to work with the PowerBuilder tool set. In the future, these objects wil be available for any tool set that supports the OCX standard.

The merger is expected to be completed by March. ■

SHARED LOGIC

Marc Myers



Don't count Novell out just yet

Market analysts have concluded that high-technology companies, and particularly computer hardware and software companies, were the main cause of Wall Street's record-breaking 1995 bull market.

But Novell, Inc., the world leader in networking software and an increasingly aggressive player in the application market, was trading at $15 1/8 last week, near the company's 52-week low of $13 1/4.

In an effort to understand the reasons behind the stock's 1995 performance, I researched the company in detail, examined its products in our labs, read its technology position papers, talked to stock market analysts and interviewed Novell Chairman and CEO Robert Frankenberg.

According to International Data Corp.'s recently released statistics, NetWare ran on 64% of the world's LANs in 1995, down from 66% in 1994.

So while Microsoft Corp.'s public relations may be declaring Windows NT the new leader in networking software, this is far from true.

Not only is Novell the leader, but it has a fairly new leader in Frankenberg.

The former Hewlett-Packard Co. vice president has quickly taken a series of strong and decisive steps aimed not only at eliminating some of the problematic acquisitions of the Ray Noorda era, but also toward building a new vision of Novell's future.

I confronted Frankenberg with two critical questions in an interview: What is your vision for the future of Novell, and will that vision be realized in a reasonable time frame?

Frankenberg's strategy for the evolution of the Novell product line is undeniably innovative. But what's more important is that the strategy is being realized in the short time frames that are mandatory in today's impatient market.

Among the exciting new offerings are AT&T NetWare Connect Services, which provides secure commercial transactions and Internet connectivity. It became available in early December.

Also in December, the company began shipping NetWare SMP, which can run on up to 64 processors and squarely positions NetWare in the application server arena.

And like every other major high-tech company, Novell is pouncing on the Internet. Its Internet server option is available today, reportedly running three times faster than any other commercially available plug-and-play Internet server.

The company's longer term strategy is equally grounded in its core competency: networking software.

Net2000 will provide a single API layer with which developers can build applications for accessing distributed nets. Novell has hinted it will provide hooks to Windows NT and other operating systems.

Net2000 will build organically on the API that Novell already has evolved for NetWare.

Then there's Frankenberg's goal of "taking NetWare everywhere." As I spoke with him, he gazed out his window at the power lines crisscrossing the Utah landscape.

He said simply that the great thing about power lines is that they go everywhere. So Frankenberg is going to run NetWare through them.

My conclusion is that the new Novell is going to be 1996's huge success story. The company is drastically undervalued because analysts are looking at earnings reports, not at its new products, strategies and management team.

Myers is president of Client/Server Connection, Ltd., a Cambridge, Mass., firm specializing in client/server software solutions. He can be reached at (800) 622-1108, Ext. 522, or via CompuServe at 71332,1726.

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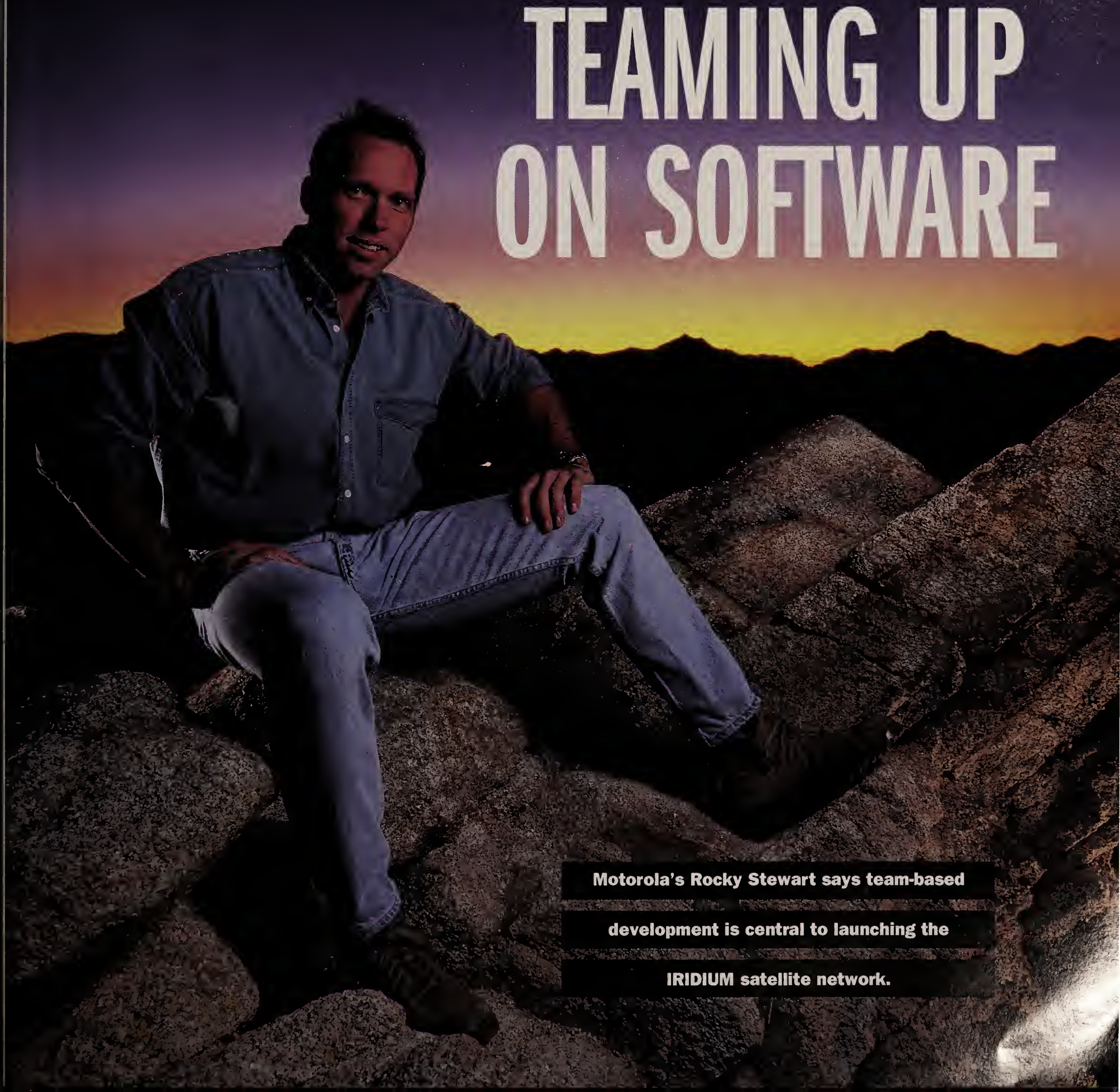

Motorola's Rocky Stewart says team-based development is central to launching the IRIDIUM satellite network.

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Circle Reader Service #30

A new year, a refined focus

Collaboration enters 1996, its third year, with a refined focus and a new tag line that reflects the change: Tools and Technologies for Teams.

Our basic mission remains the same – to examine the information system tools companies are deploying to support newly formed team-based organizational structures.

To emphasize the team focus, Collaboration will publish four basic types of articles:

- Teamwork – case studies about how companies are using technology to bolster team effort.
- Team tools – examining network goods like messaging, groupware, videoconferencing and group decision making aids.
- Team resources – looking at shared technologies such as knowledge bases and data warehouses that corporate teams can call on to make more informed decisions.
- Team computing – focusing on distributed computing technologies like ATM, OLE and DCE that make it possible to build the robust network environments that collaborative-ready teams demand.

The year looks to be rich in promise, with developments such as the IBM acquisition of Lotus and the arrival of Microsoft Exchange and Lotus Notes 4 elevating the attention on team tools to a new level.

Stay tuned.

– John Dix
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By Beth Schultz

A corporate headquarters without offices. Employees without titles. No hierarchical personnel structure. Most business operations handled by outside firms. Sounds like a CEO's nightmare, but for Ralph Ungermann it is a dream come true.

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By John Dix

Developing a few million lines of software code is hard enough, but think of the challenges raised when the developers are scattered all over the globe. That is the scope of Motorola's massive IRIDIUM network project.

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By Beth Schultz

Stanford University Professor Mark Cutkosky specializes in finding ways to allow people to collaborate on design and manufacturing projects. In this Q&A, Cutkosky discusses how he has used the Internet and the World-Wide Web as pillars in design projects.

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By Joanne Cummings

What do dancing Shell credit cards, the Monopoly game and Contact cold medicine have in common? A collaborative telecom service was used in creating these products' latest ads.

DEPARTMENTS

4 Sum of the parts

3-D simulation environments provide the ultimate collaborative tool for some R&D teams; ConferTech gets set to release the first T.120-compliant document conferencing bridge; Novell's GroupWise passes the 5 million mark; IDC study shows users most want E-mail and desktop application suites integrated with groupware.

30 Collaboratus

Will the Web kill Notes? *By Jeff Held*

In a word, no. But the volume of hype and misinformation on this topic is deafening. The problem is that most of what you hear and read is dead wrong. The Web is not a direct threat to Notes, at least not now.

SUM OF THE PARTS

Tips and tidbits about collaboration products, issues and trends

Collaborating in another dimension

Some research and development groups are trading in traditional groupware tools and making the trek into the virtual realm.

These advanced teams work in Cave Automatic Virtual Environments (CAVEs), which more or less look like stark, black cubicles. In here, members of a Ford Motor Co. engineering team, for example, can "step" into a Taurus and see what happens if they move a dashboard component.

These interactive 3-D simulations can be viewed in more than one virtual environment at a time, whether it be a full-blown CAVE, a wall screen or at a specialized desktop unit, meaning disparately located Ford engineers can collaborate on a design regardless of their locations.

"There's something compelling about CAVE technology," says Rick Stevens, director of the Mathematics and Computer Science Division at Argonne National Laboratory. "We take people in there, whether engineers or CEOs, and they understand its impact right away."

Until recently, CAVEs have been used primarily by researchers and academics, but corporate managers are beginning to figure out how virtual reality and interactive simulations can be used commercially, says Mary Spada, a principal with Global Growth Strategies, a Maryland consulting firm.

She cites McDonald's Corp., which plans to move architectural design into this realm, as an example.

A bridge to T.120 conferencing

ConferTech's Prelude bridge will link remote team members.

Far-flung team members who need to share text files, spreadsheets, graphic images and the like may find help from a soon-to-be-released document conferencing bridge from ConferTech International, Inc.

When it ships this quarter, ConferTech's Prelude conferencing bridge will be the first such device to comply with the International Telecommunication Union's T.120 standards suite.

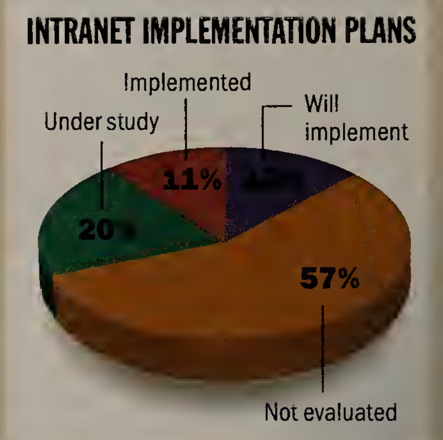
The standards describe specifications for distributing data during a multipoint, multimedia conference supported by a variety of transmission media.

In Prelude's case, teams can conduct multipoint sessions over any combination of analog modem, Novell, Inc. IPX or TCP/IP networks. The bridge will interoperate with T.120-based end-user document conferencing products, such as DataBeam Corp.'s FarSite desktop software and Polycom Inc.'s ShowStation room-based projector, says Joe Sullivan, director of multimedia services for ConferTech, of Denver.

Prelude can be used to manage sessions on a company's data network or as a gateway to other conferencing networks, such as ConferTech's own ConferCallPlus service bureau. The bridge provides features such as conference scheduling, connection management, conference monitoring, call detail reporting, remote management and network security.

Sullivan says document conferences will be conducted by themselves or as part of a videoconference. "T.120-based document conferencing will supplement videoconferences by providing high-resolution, full-color, multipoint data sharing capability," he says.

Prelude, which can be configured with as few as eight or as many as 24 ports, will cost $2,500 per port. Three bridges can be linked for a maximum configuration of 72 ports, Sullivan says.


INTRANET IMPLEMENTATION PLANS

Rise of the Intranet

The idea of building corporate groupware platforms using World-Wide Web technology is gaining favor fast, according to research from the Business Research Group in Newton, Mass.

Already 23% of the sites surveyed have implemented or plan to implement internal Webs, now called Intranets. Another 20% are studying the possibility.

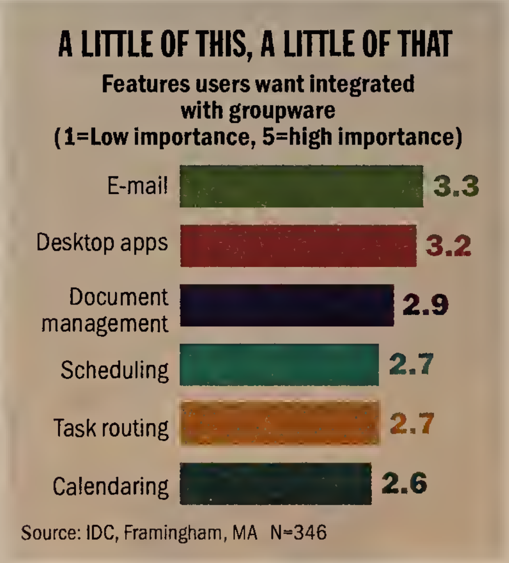
While Unix is still the most popular operating system for internal Webs, favored by 45% of the respondents, Windows NT is used by 17%. "Windows NT and Windows 95 will most likely be the platforms of choice for Intranet servers" going forward, BRG predicted.

GroupWise hits 5 million mark

Novell, Inc. is not just a network operating system vendor any longer.

The company closed its fiscal year last fall with more than 5 million users of its GroupWise groupware software. Among those scores are 2 million who joined the GroupWise fold last year, resulting in an annual growth rate for the product of 128 percent, Novell said.

Kinko's, Inc., one of the country's largest copying and document production chains, pushed Novell over the 5 million mark when it picked GroupWise after conducting a cost-benefit analysis. Last year, the company installed the groupware software at its headquarters in Ventura, Calif., and at distributed corporate offices, says Dawn Graham, director of information services at Kinko's.


A LITTLE OF THIS, A LITTLE OF THAT

Features users want integrated with groupware (1=Low importance, 5=high importance)

Source: IDC, Framingham, MA N=346

Throughout 1996, Kinko's will roll out GroupWise to its 800 branch sites. "We want to maximize the productivity of our people, information and time," Graham says.

In a white paper on the workgroup applications market, research firm International Data Corp. of Framingham, Mass., attributes much of the interest in GroupWise to its ability to integrate with desktop and enterprise applications. Incorporation of workgroup applications into other software, such as operating systems, is an imperative going forward, IDC says.

In 1994, 19% of the 18.8 million users of groupware worldwide were Novell customers, compared to 17% who were Microsoft users and 7% Notes customers, according to IDC.

Lotus, however, captured 29% of the $740 million worldwide groupware revenues versus Novell's 7% and Microsoft's 2% stakes, IDC reports.

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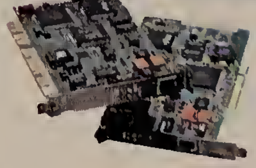

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Circle Reader Service #32

Foraging in the team toolbox

Conferencing, whiteboard and BBS systems.

By Mark Gibbs

TOOLS FOR TEAMS

Collaborative environments don't come cheap. The products are costly, they eat up bandwidth and they often require an infrastructure overhaul.

Here's a look at three tools, two of them shareware offerings, that provide promise and are easy on your budget and your network.

WYSIWYG

There is a certain comfort in collaborating with colleagues face-to-face rather than over the phone or via E-mail. It adds confidence and trust. But since you can't be everywhere at once, the next best thing for breeding cooperation is videoconferencing.

Unfortunately, full-fledged videoconferencing (30 frames/sec, 24-bit color and 16-bit sound) is a glutton for bandwidth. A few sessions will even max out a LAN. But it is in the wide area that video conferencing becomes truly problematic. Wide-area solutions tend to be expensive to acquire, hard to configure and costly to operate.

There is an alternative, albeit a quirky one that is not ready for mainstream business use today but may be a sign of things to come.

A novel application called CU-SeeMe is the first widely available Internet-compatible videoconferencing system. Originally developed at Cornell University with funding and cooperation from the National Science Foundation and other organizations, CU-SeeMe is now being developed jointly by Cornell and White Pine Software of Nashua, N.H., with White Pine as Master Licensee of CU-SeeMe technology.

If the name smacks of voyeurism, be forewarned. One of the principal uses of the technology at this point seems to be of an adult nature, although NASA and a few other organizations have found legitimate applications.

CU-SeeMe supports a peer architecture allowing direct person-to-person connections, the equivalent of video phone calls. Where group teleconferencing is required, a server system called a Reflector can be set up to handle multi-way connections.

In the Cornell documentation, Tim Dorcey, a CU-SeeMe senior developer, says: "One of the central objectives in developing CU-SeeMe was to make it available to the widest possible range of users, under the belief that the value of a communications technology is in large part determined by the number of people with access to it."

It is for this reason that the technology uses no proprietary hardware and was specifically designed for low-bandwidth network connections.

The current system is limited to transmitting video in black and white (4-bit grayscale video windows at 160x120 pixels) and, due to network bandwidth limitations, at a slower frame rate than full-motion video. Audio also sometimes becomes distorted but, on the whole, is reasonable. In the future, as higher speed connections become more widely available, performance and picture quality will improve.

Freeware versions of CU-SeeMe clients for Macintoshes and Windows PCs can be downloaded from a number of sources, including ftp://gated.cornell.edu:/pub/video, while White Pine's alpha release can be found at http://www.wpine.com/cu-seeme.html.

Not surprisingly, the factors that determine the quality of CU-SeeMe connections revolve around speed: how fast your computer and your Internet connection are.

From the communications viewpoint, you'll need an IP network connection of at least 28.8K bit/sec. PC and Macintosh clients require only basic sound and video support for receive-only service, and the addition of microphones, video boards and a camera for broadcast.

Once you have it working and you point your CU-SeeMe system at another CU-SeeMe user (for a one-to-one connection) or a Reflector site (for broadcast or multi-way conferences), you'll see a window slowly tile with the picture of the remote scene.

CU-SeeMe uses a clever algorithm that only broadcasts changes in the scene, rather than updating the entire frame. The update rate is managed to provide as usable an image as possible. As a consequence, fast moving objects may blur, break into pieces or rapidly appear and disappear.

Despite there shortcomings, CU-SeeMe is becoming increasingly popular. You'll find a growing list of CU-SeeMe Reflector sites at http://magneto.csc.ncsu.edu/Multimedia/CU-SeeMe/reflect_list.html, and a good source of discussion can be found on the CU-SeeMe mailing list (send E-mail to listserv@cornell.edu with a message body of subscribe cu-seeme-l FirstName LastName).

One organization finding CU-SeeMe of interest for testing videoconferencing over the Internet is NASA-TV, which uses CU-SeeMe for daily broadcasts of space shuttle transmissions, astronaut interviews, control room activity and so on.

Even the entertainment industry is getting into the act. There have already been a number of CU-SeeMe live-over-the-Internet performances .

For the moment, CU-SeeMe is in the "nice idea" stage. But when White Pine finishes its development and releases a full-blown, supported product, I predict that there will be an explosion of commercial interest.

WANs can canvas

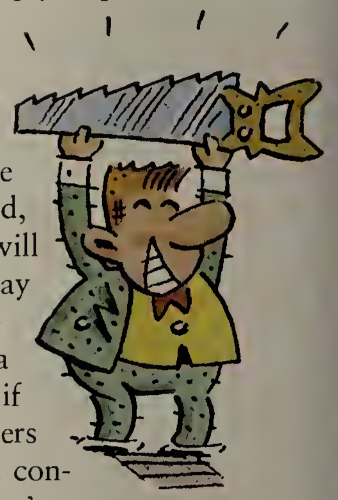
While not as powerful as videoconferencing, collaboration using distributed whiteboards can be very useful.

Distributed whiteboards provide a graphical workspace that can be manipulated by two or more users, vastly simplifying the task of jointly developing or reviewing text, graphics or visual material. There are a few distributed whiteboard products that come with TCP/IP suites but they are poorly documented, ridiculously difficult to set up and look like afterthoughts thrown in to beef up the suite's contents.

A shareware product that appears more promising and is certainly easier to install and use is WANVAS (Wide Area Canvas) from Ember Software of Richland, Wash. WANVAS is a basic distributed whiteboard that operates over Winsock-based TCP/IP networks. It can be found in many file collections, including http://winsite.com/win3/winsock/ and Ember's own site, http://www. owt.com/ember/.

With WANVAS, up to 11 participants can manipulate a shared workspace of graphical objects, which can be moved, re-sized, copied and so on. These objects can be created with drawing tools or text entry tools and pasted into bit maps. There's also an integrated chat window so users can exchange messages.

Setting up WANVAS is as simple as unpacking the archive file into a directory and launching the application. Configuration simply requires defining the name you want to use.



In use, WANVAS' performance is pretty good, although users will see a slight delay before the originating user's data is received and, if one or more users are on low-speed connections, the group's overall response time will be lowered.

WANVAS also lacks sophistication in several areas, notably its user interface, which is a bit clumsy, and its chat system, which takes up far too much screen real estate when maximized and has no alert feature to warn you of chat activity when minimized.

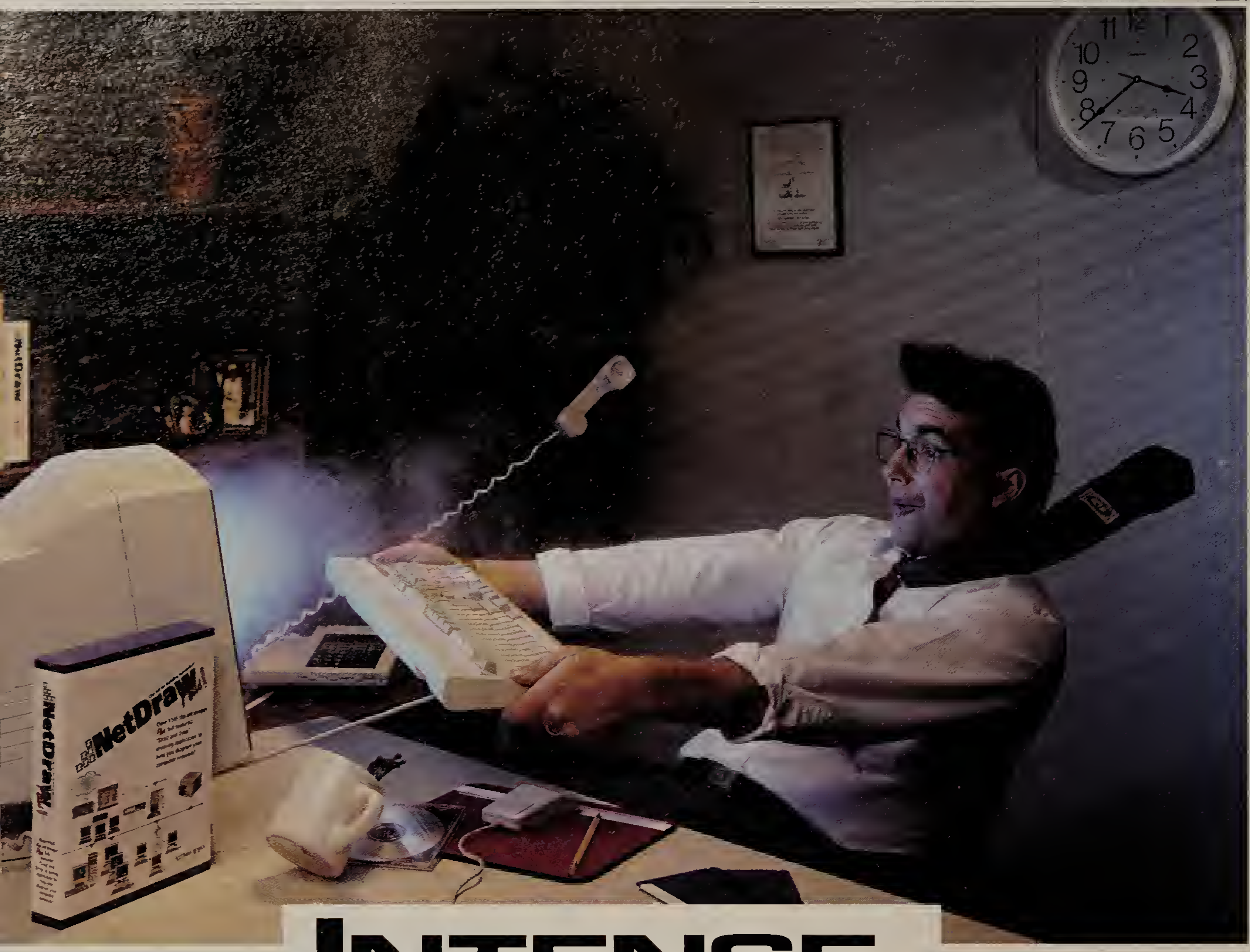
That said, WANVAS has some useful features. For example, a session with WANVAS can be recorded to disk and replayed with VCR-style controls to all users in a WANVAS session. Unfortunately, this replay occurs at the maximum speed possible, which may not always be what is required. A step-by-step mode would be useful. WANVAS can also capture any portion of the screen as a moveable object, and the WANVAS page can be saved as a bit map or printed.

I found some instability when using WANVAS with NetManage's Chameleon 4.5 Winsock (I suffered infrequent and random GDI crashes). Potential users should test WANVAS thoroughly before committing to it.

This product is potentially and practically very useful but young. For its asking price ($10 per copy without disk), WANVAS is a good value. When the product matures, this could be a great piece of software.

First class

Bulletin board systems are a venera-



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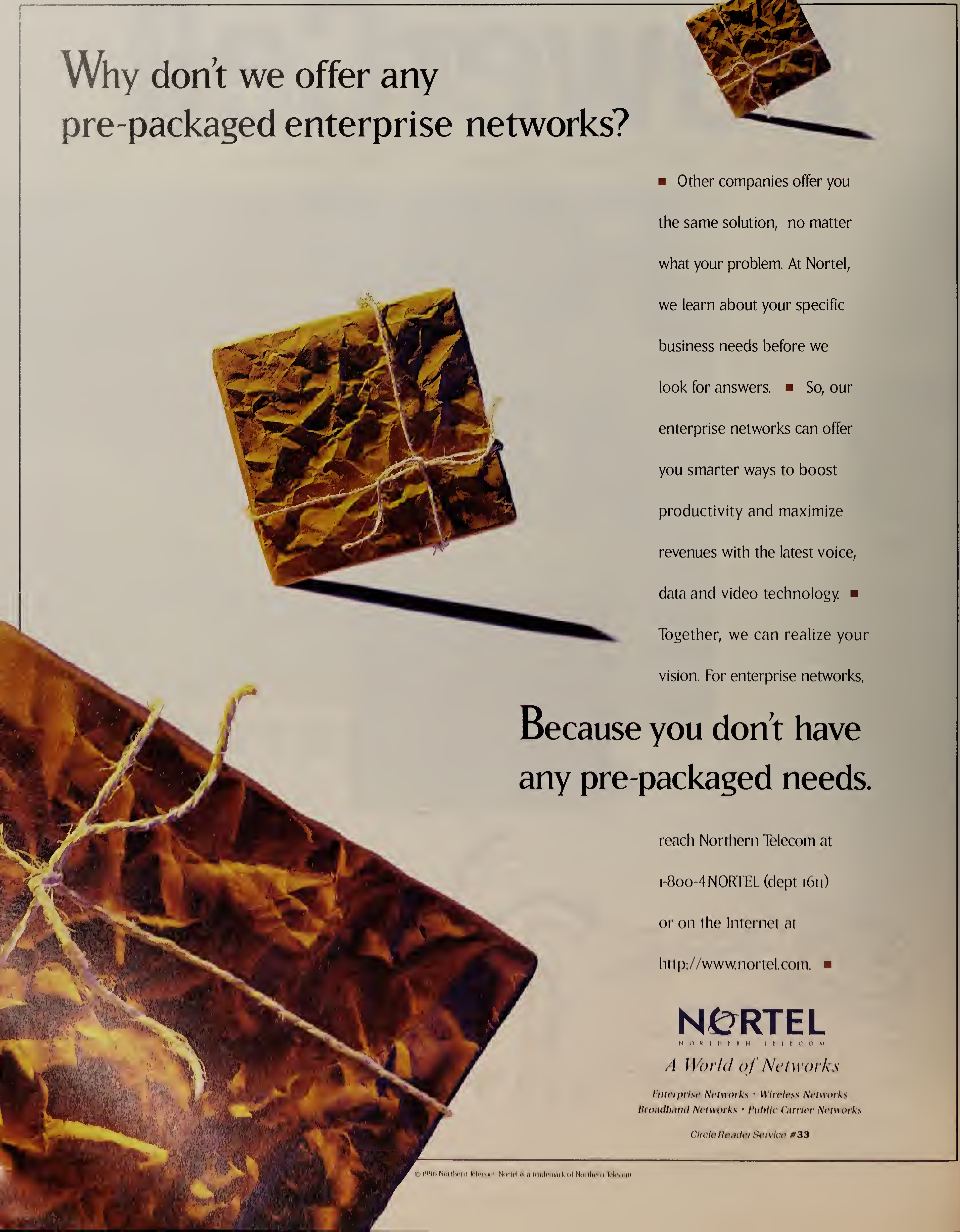

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ble tool for collaborative work, but with the emergence of applications such as Lotus Notes and sophisticated electronic mail products, they have fallen out of favor. Add to that the advent of the World-Wide Web, and BBSs have started to look passe.

Responding to this changing climate, SoftArc of Toronto has offered the ability to connect its advanced BBS system, called FirstClass, to TCP/IP networks. This product allows SoftArc Macintosh and PC clients to access the server via the Internet or private networks supporting IPX or TCP/IP. And to ensure maximum access, FirstClass also supports dial-in ASCII terminal users.

Going one step further, the latest release of the FirstClass server, historically only available for the Macintosh, is now available for Windows NT.

Beyond its wide range of connection options, FirstClass is also different from other BBS systems in that it offers a sophisticated client user interface. Surprisingly, under Windows, this interface shows the Macintosh roots of the system in that some of the general conventions of Windows interfaces are different or missing. For example, in several places, ESCAPE doesn't equate to CANCEL.

Installing FirstClass on a server or client is easy; you simply identify where the software is to be installed and which components to include. An elegant aspect of the client configuration is the use of files, called "documents," that contain the connection parameters. This allows you to have a number of configurations as needed — one for the office network, one for remote dial-up when traveling, one for home, and so on.

When a user first connects to FirstClass, they can auto-register (if that feature has been enabled) or log-in as a previously named account. FirstClass offers users folders that, by default, include a mailbox folder, a news conference folder, a conference folder and a help folder. While users can create sub-folders as required, creating new conferences requires the related privilege to be set.

The range of services and features of FirstClass is awesome. There is extensive security, a range of management features, file transfer facilities, and a text-based, on-line chat facility.

In use, FirstClass is comprehensive and intuitive. There is little that an experienced user will find unusual or with which novices will struggle. Management is also straightforward.

FirstClass has few rough edges and is extremely robust. There is also a growing and active third-party market that can supply database connectivity as well as gateways to a variety of external mail services such as Simple Mail Transfer Protocol servers.

The one issue that network managers will have with the NT implementation is that it is processor-hungry. Tests on a 66-MHz 80486 system running Windows NT 3.5 showed the vast majority of available processor time was absorbed when the FirstClass server was running.

For organizations that need a BBS-type collaboration solution that is easy to install and manage and presents a sophisticated interface, there are few other practical choices. ■

Gibbs is a consultant and writer based in Ventura Calif.: 800-622-1108, ext. 504, or mgibbs@gibbs.com.

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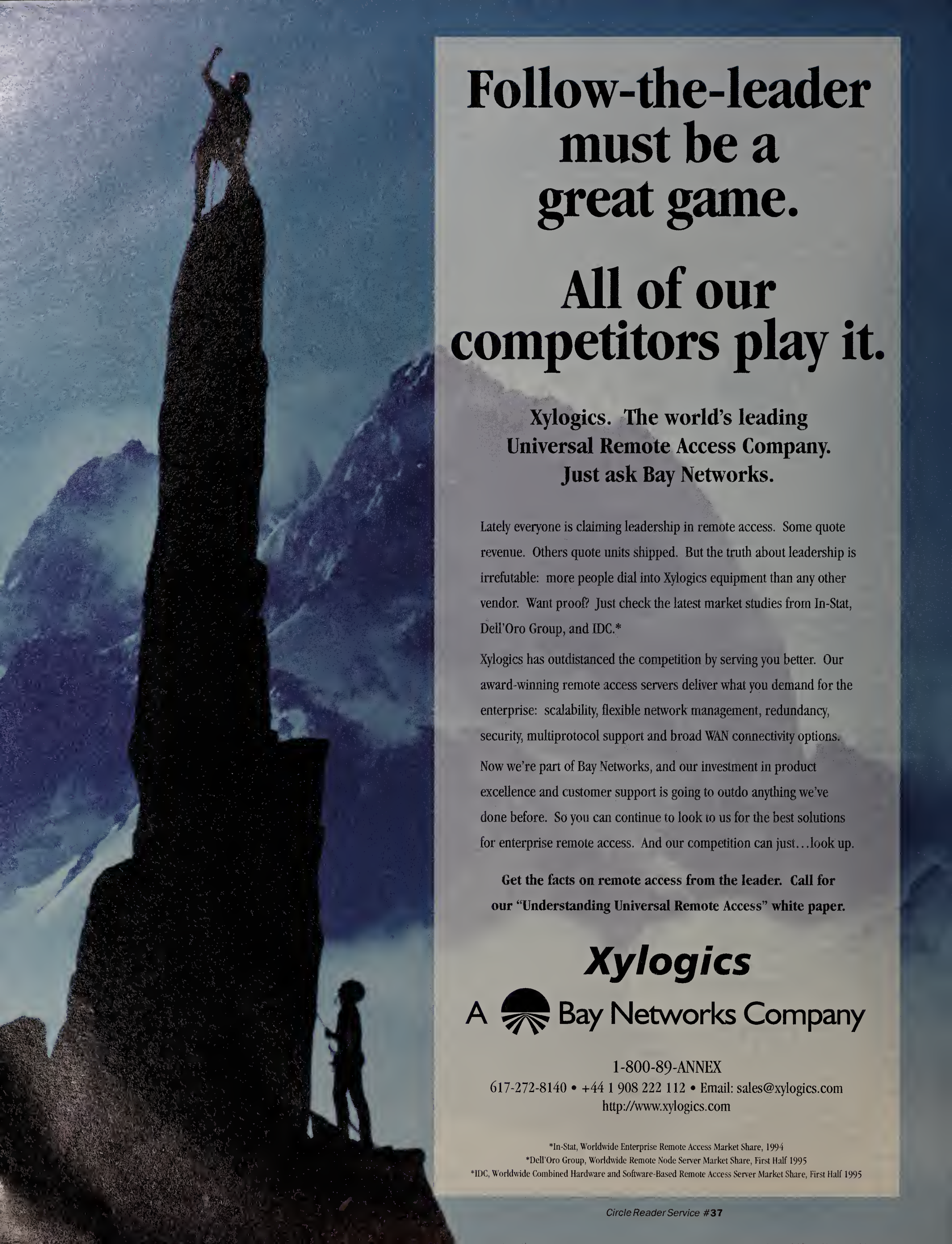

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*Dell'Oro Group, Worldwide Remote Node Server Market Share, First Half 1995
*IDC, Worldwide Combined Hardware and Software-Based Remote Access Server Market Share, First Half 1995

Circle Reader Service **#37**

A real virtual network corporation

By Beth Schultz

Start-up veteran Ralph Ungermann shunned traditional business models in favor of a virtual structure when launching his third high-tech company, aptly named First Virtual Corp.

A corporate headquarters without offices or cubicles, employees without titles, no hierarchical personnel structure and most business operations handled by outside firms? It sounds like a CEO's worst nightmare, but for entrepreneur Ralph Ungermann, it is a dream come true.

Casting aside the trappings of the plush executive suite and the safety of tried-and-true traditional business models, start-up veteran Ungermann has embraced the virtual corporation concept in his most recent endeavor, First Virtual Corp. (FVC) of Santa Clara, Calif. Ungermann's entrepreneurship harkens back to the 1970s, when he launched Zilog Inc., and the 1980s, when he created Ungermann-Bass, Inc., one of the first LAN companies.

"This time, I wanted to start a different kind of company. I wanted a different architecture for the company based on the experiences [I had] with the other two companies I founded, and from seeing what's happening in the world," Ungermann says. He stresses that speed and leverage are the words to live by when running a high-tech business in this era.

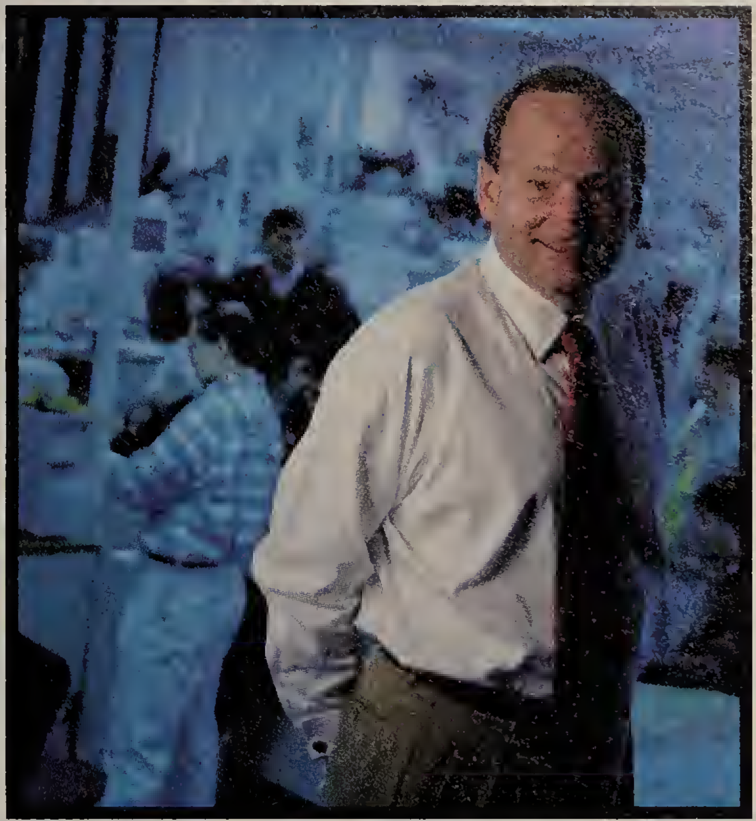
"There are two things you can do to be really successful: You can find a proprietary monopoly, like DOS or Windows, or you can be very fast and very leveraged," he says. And since the likelihood of monopolizing a technology today is really nil, building a company focused on speed and leverage is the way to go.

A multimedia switch. *FVC's ATM workgroup switch is intended to facilitate desktop multimedia collaboration.*

Given that, a virtual corporation makes the only sense, Ungermann contends. "We felt the best way to build the company was to keep it relatively small, and to just focus on an innovative and very narrow area where we could make a huge contribution — something that nobody else had done. And then, partner for everything else," he says.

Ungermann picked desktop multimedia networking as the golden technology.

"We believe fundamentally that the PC is going to become a communications tool in addition to being a computing tool. It is to a small degree today with E-mail, but we still have the telephone and the fax and other devices. We think the PC is going to become the center of that, and that video and audio are going to play a big part," Ungermann explains.



EDWARD CALDWELL

Ralph Ungermann: *Only virtual companies can attain the speed and leverage necessary for business today.*

FVC's goal is to deliver products that let teams of people conduct high-quality virtual meetings. "We're providing the tools that allow you to work in different time zones and different locations," he says. "There are a lot of people who think collaboration hasn't taken off because the quality hasn't been good enough to replace travel."

The only technology that can deliver that quality is ATM, he says. "We offer all the classes of service you need to do interactive voice, interactive video, stored video and high-speed data all at once on your PC."

FVC's product portfolio comprises an ATM workgroup switch, a 25M bit/sec ATM adapter card, an ATM-to-ISDN gateway, a multimedia storage device and middleware that lets Windows applications run over ATM without changes.

Once Ungermann picked desktop multimedia networking as his golden technology, he established a core group in Santa Clara to develop and market products, and he began teaming with outside firms to handle other basic business functions — distribution, finance, human resources, manufacturing, MIS, public relations and the like.

"We only want to do a few things, and only if we can do them better than anybody else. Our goal is to find really strong partners and let them be part of our team," Ungermann explains.

"This is a very modern approach to business," says Jim Swartz, managing partner at Accel Partners, a San Francisco-based venture capital firm that provided the first round of financing for FVC. "Parts of it have been executed by a lot of Silicon Valley companies, but Ralph is taking it to the next level by trying to do as much partnering as possible. He's pushing the envelope of what's possible within an organization."

"The idea of a virtual corporation has been around for a long, long time, and unfortunately, a lot of people think of it as working out of your house," Ungermann says. "But First Virtual

Corp. is really a federation of teams spread out around the world that are working on a common goal and sharing the rewards of that endeavor."

FVC has divided its partnerships into three categories, explains Douglas Tsui, who works in customer operations. FVC has internal teams, distribution teams and technology teams.

"We didn't want to put First Virtual people in Japan, "Ungermann says." We wanted to find a Japanese partner who shared our vision of the market and the architecture of the company, who had lots of resources and could take our innovative products and quickly get them into the mainstream. So we talked to some 35 different Japanese companies, and we picked one.

FVC chose Kanematsu Corp., a $62 billion trading company based in Tokyo. Kanematsu sells everything from ramen noodles to rockets, and now, desktop multimedia networking products, says Rob Jacobs, an assistant manager with Kanematsu USA, Inc., of New York.

Operating under the name First Virtual Corp. of Japan, Kanematsu takes the FVC products and localizes them by adding the appropriate interfaces, for example. It then integrates the FVC wares into its product line and sells them, either directly or through other companies, such as

On the inside

FVC's internal team environment becomes immediately apparent to anyone who stops by for a visit. The company's office suite is primarily a big open space filled with clusters of desks. Without offices or any other sort of dividers, FVC's corporate headquarters looks more like a classroom than a high-technology business.

"Ralph is deliberately, visibly reinforcing that this is a different business model," says Thomas Nolle, principal at CIMI Corp., a consulting firm in Voorhees, N.J.

Each of FVC's 33 employees in Santa Clara calls this room home, including Ungermann. "The idea is to break down all those barriers by not having any walls, any physical boundaries," he says.

"And since there are no organizational boundaries either," Ungermann adds, "it is almost impossible for engineering and marketing not to work together. It's hard to build barriers when you're sitting elbow to elbow and can ask questions and resolve misunderstandings in seconds."

This openness affords FVC considerable flexibility in moving people from project to project. The loose structure alleviates the political and bureaucratic sticking points that often plague traditional corporate setups. "We build teams for projects and change them as necessary," Ungermann says.

In product development, for example, he can pull together small teams of people and designate one person as team leader. Six months later, that person might be part of another team, but not its leader.

Ungermann acknowledges that not everyone is cut out for this type of virtual environment, and he carefully screens job candidates. "The main thing about starting the company fresh is you can bring people in that can buy into the architecture. It's not like changing a company, where you have to get people to change their views and opinions," he says.

To Ungermann, it is imperative not only that FVC employees believe in the virtual corporation, but also that all of its partners do. The company's efforts to establish a presence in Japan exemplifies this.

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"We have no people there, but [Kanematsu] has a team of people that's part of our virtual corporation. And it has been able to attract lots of other large partners into our virtual corporation, so we hit the ground running in Japan," Ungermann says. "It's a combination of our speed and its muscle."

Ungermann points out that FVC's desktop multimedia networking products facilitate teamwork between his folks in the U.S. and their counterparts in Japan. "Japan presents a particularly hard partnership situation because of differences in time, language and culture. Our video collaboration tool is very important for that," he says. "We can't all travel, but it's possible with our tools to see, talk, share things and work together much more effectively."

Taking into account its myriad partnerships, a virtual corporation like FVC is really a superintegrator, says CIMI's Nolle. "The virtual model is employed by lots of VARs and integrators. In many respects, FVC is a VAR, and there's nothing wrong with taking an old concept and giving it new life," he says. "Ralph has figured out how to elevate this concept to something that's visible and credible."

Accel's Swartz points out that FVC adds a twist to the ultra-integrator concept. "The classic definition of integration doesn't allow for technology being provided by the integrator, and with Ralph's company, that's the case," he says.

Indeed, while teaming with a variety of vendors for bits of the technology it needs to build its desktop multimedia networking portfolio, FVC develops other pieces itself. For example, FVC licensed critical ATM software and hardware from ATML and allied itself with AT&T in development of an ISDN gateway. But it internally wrote important middleware that lets Windows applications run over ATM without any programming.

Virtually in stride

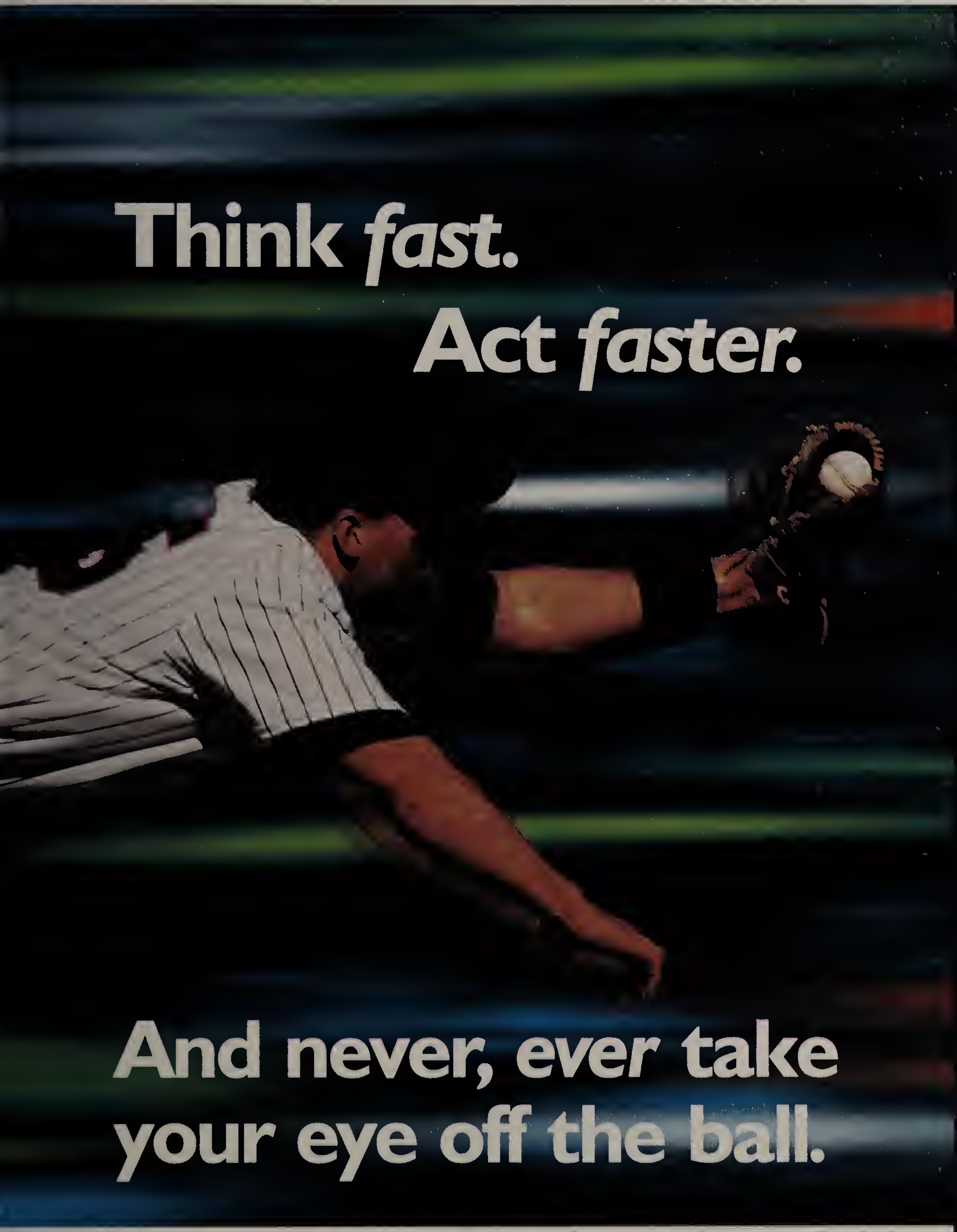
Operating as a virtual corporation gives FVC the unprecedented ability to stay in stride with market changes from a technology perspective. "One of the advantages of the virtual corporation is if Ralph wants to do something about ATM data architectures, he can just drag into his virtual web a company that is doing just that," says Nolle, noting that FVC can team with a vendor to get Multiprotocol Over ATM (MPOA) technology, for instance.

"Now if your company is filled with MPOA bigots and the world turns to Winsock API applications, your engineers sit on their hands. Internal people often don't have the breadth to change," Nolle continues. "There have been a lot of companies whose internal technical biases have destroyed them — they could never do anything beyond the initial product. But a virtual corporation doesn't have internal constituencies."

Instead, Nolle says, a virtual corporation has a marketing direction at its core and establishes a set of relationships that make it possible to build tangible product around that direction.

Ungermann contends that this strategy is a must for high-tech companies going forward. "I think that companies that don't use the virtual corporation model are missing a huge competitive advantage. It's all in speed and teamwork." ■

Schultz is managing editor of Collaboration.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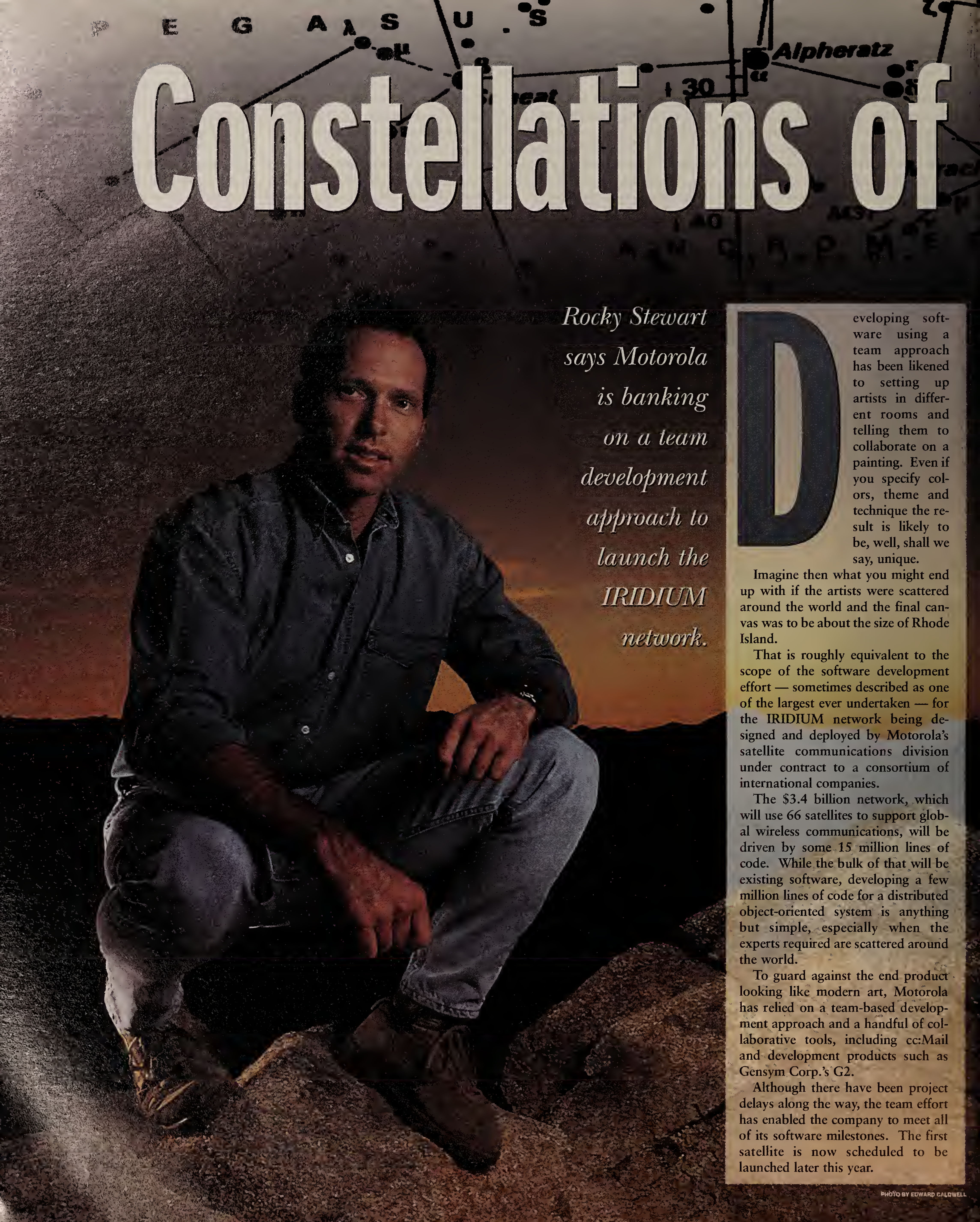


Rocky Stewart says Motorola is banking on a team development approach to launch the IRIDIUM network.

Developing software using a team approach has been likened to setting up artists in different rooms and telling them to collaborate on a painting. Even if you specify colors, theme and technique the result is likely to be, well, shall we say, unique.

Imagine then what you might end up with if the artists were scattered around the world and the final canvas was to be about the size of Rhode Island.

That is roughly equivalent to the scope of the software development effort — sometimes described as one of the largest ever undertaken — for the IRIDIUM network being designed and deployed by Motorola's satellite communications division under contract to a consortium of international companies.

The $3.4 billion network, which will use 66 satellites to support global wireless communications, will be driven by some 15 million lines of code. While the bulk of that will be existing software, developing a few million lines of code for a distributed object-oriented system is anything but simple, especially when the experts required are scattered around the world.

To guard against the end product looking like modern art, Motorola has relied on a team-based development approach and a handful of collaborative tools, including cc:Mail and development products such as Gensym Corp.'s G2.

Although there have been project delays along the way, the team effort has enabled the company to meet all of its software milestones. The first satellite is now scheduled to be launched later this year.

PHOTO BY EDWARD CALDWELL

software teams

Motorola learned some of its teaming lessons the hard way.

"Part of our engineering process is defining the team structure," says Rocky Stewart, lead software architect for the systems control segment of the IRIDIUM system (he has since moved over to another Motorola distributed object project). "We're improving the process as we go and getting better at it."

IRIDIUM teams today, for example, are more or less autonomous, self-contained and responsible for development of specific subsystems, a more formal approach to team design than in the past.

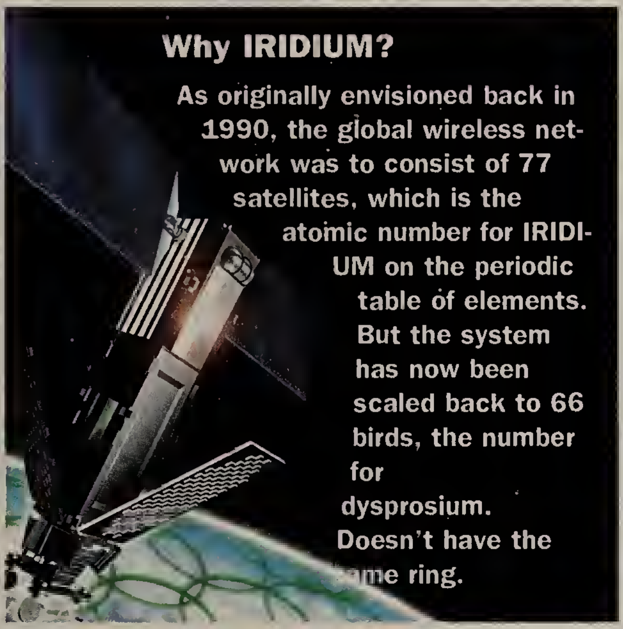
Stewart's systems control group is one of five core IRIDIUM segments, the others being: the gateway segment, which is responsible for integrating the IRIDIUM network with the terrestrial network; the space segment, responsible for designing and launching the satellites; the IRIDIUM Subscriber Unit segment, which makes the telephones; and the segment that deals with business issues.

Except for the business segment, each of these groups is subdivided into teams responsible for designing major subsystems. Stewart's systems control segment, for example, includes the satellite command team, the network management team, a resource planning and scheduling team, and an orbit team.

All subsystems have well-defined interfaces to other subsystems, making it possible to distribute development when necessary. "You try to find loosely coupled pieces, and take those pieces and drop them at various sites," Stewart says.

But the distributed approach comes at a cost.

"Collocated software development is hard enough," Stewart says. "Distributing it makes it harder and adds a lot of accidental complexity. You find you have all kinds of problems with simple little things like sending a fax to a site in Ireland."



Why IRIDIUM?

As originally envisioned back in 1990, the global wireless network was to consist of 77 satellites, which is the atomic number for IRIDIUM on the periodic table of elements. But the system has now been scaled back to 66 birds, the number for dysprosium. Doesn't have the same ring.

PHOTO BY REED RAHN

Distributed development is a sufferable necessity for the IRIDIUM system, not an end unto itself: The job is just too big and the experts too scarce to tackle the project on a centralized basis.

Keep it simple

To enhance productivity, Motorola tries to keep the teams focused. Although they differ in size, the network management team of 20 is characteristic, Stewart says. "The rules of thumb are: Keep it simple, keep it collocated, keep the team small, and use your best people on the team.

"People are much more motivated on small teams," Stewart says. "If you're on a team responsible for a deliverable, and you know what your tasks are and what happens if your tasks aren't done, then it's obvious what value you bring and you feel better about your job."

The smaller teams also make it possible to keep people hands-on. Stewart's group, for example, tried to use entry-level people to do implementation work while reserving seasoned pros as technical leads that could be moved around as a resource. "That didn't pay off as well as having those people doing the actual implementation," Stewart says.

The teams are very flat and organized around a responsibility structure rather than a management structure.

"We have domain experts that are responsible for their piece of the product, and they have to know how to interact with the other people on the team. Everyone reports to one person," Stewart says. "That person reports to the traditional hierarchy and is responsible for client resources and dealing with issues that are outside of the team. It works very well."

All of the teams use a rapid prototyping development method to speed

Rocky's rules for teams

Team dynamics can provide great gains over individual effort, but that doesn't mean teaming comes naturally.

One of the early problems found by Rocky Stewart, lead software architect for the systems control segment of the IRIDIUM system, was a tendency to over-team.

"We were getting ourselves involved in so many teams we were ineffective," Stewart says. "You have to focus. Have one primary team where you focus most of your effort as an individual, then one or two secondary teams where you act as more of a consultant. If you have more teams than you have people, you have a problem."

Another early discovery was the tendency to hold too many meetings. "We were having fire drill meetings, even when there were no fires," Stewart says. "As a result, we now hold meetings only when issues need to be resolved."

Here are Stewart's Top 10 rules for distributed development using teams:

1. **Keep it simple.**
2. **Minimize distribution as much as possible.**
3. **Keep teams small.**
4. **Use your best people.**
5. **Avoid over-teaming.**
6. **Only distribute loosely coupled components with well-defined interfaces.**
7. **Use a spiral, incremental prototyping approach. Avoid the waterfall approach at all costs.**
8. **Keep your tools, such as E-mail, consistent across teams.**
9. **Automate metrics collection to relieve developers of this task.**
10. **Make sure you have good network connections among sites and encryption if the project dictates it.**

the process and reduce the chance of project drift. "If you sit down and write a bunch of requirements, and then start designing and implementing to those requirements, you'll get to the end and the users will say, 'Well, that's not quite the rock I asked for,'" Stewart says.

In place of this waterfall approach Motorola uses a spiral prototyping development process.

"You build functional prototypes incrementally, and with each increment, you add more capability," Stewart says. "That way, you have a working system that's continuously integrated and demonstrable. You get a lot more feedback from the end users if they have something to touch, as opposed to a bunch of requirements to read.

It is for this reason that customers are active members of each team. The network management team, for example, has two people from operations, one from network ops and one from satellite ops. They are the people that will have to man the system once it's up and running, so their input is invaluable. "They are on the team. They are assigned work. They go to reviews, and they have real jobs," Stewart says.

Inter-team links

Communications among teams is kept simple, mainly just a few people discussing pair-wise interfaces between subsystem components. For example, if Team A has an interface to a component being built by Team B, and B also has an interface with Team C, then A and B will get together, and then B and C will get together. "You won't have A, B and C in one room," Stewart says. "You can't get any work done that way."

These meetings are scheduled as needed and complemented by more traditional design and implementation reviews, which are conducted by the technical oversight team.

Stewart, who is a member of the oversight team, says the team travels to design centers around the world so developers can explain the rationale behind certain decisions.

Besides ensuring that everyone is using the same play book, the reviews make it possible to identify where one team can benefit from work done by another. This can result in outright reuse of code or show where there is enough duplication of effort to make it worthwhile to alter designs to make them more generic. "Then we can provide a more abstract interface and share the base component across both groups," Stewart says.

Common tools

Although teams favor different tools, "we try to force as much consistency as possible," Stewart says. Motorola has standardized on Sybase databases, Lotus' cc:Mail and a single change management system, IBM's Configuration Management and Version Control product.

But teams also use different software development languages and environments as dictated by their needs. "We're trying to minimize the number of tools, but you can't just say, 'This one tool will work for everything,'" Stewart says.

The network management team, for example, has homed in on a tool called G2 from Gensym in Cambridge, Mass., that provides a number of benefits for team-based development efforts.

G2 is a natural language, object-oriented development environment that can be used to create system domain models that support applications developed using G2, C++ or

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other object-oriented languages. That makes it possible to layer on programs developed by other teams.

Because of G2's high-level object-oriented language and the product's integrated infrastructure, such as the ability to support check-pointing, the network management team can do in man-weeks what used to take man-years to develop, Stewart says.

Check-pointing makes it possible for a processor to assume the identity of a failed machine, a fail-safe feature critical to the type of high-availability environment required by IRIDIUM. "If we had to implement all of that [from scratch], we'd be here for years," Stewart says.

But most important is G2's ability to distribute objects over the net, which dovetails neatly with the team approach. G2, for example, eases the task of merging modules developed by different groups by resolving things like object name conflicts.

"If you're developing a module with an object called Foo, and I'm developing a module with an object called Foo, when we merge them G2 will resolve the name conflict for us," Stewart says. "Doing that by hand would be a long, tedious process."

Stewart's group also maintains an interactive style guide in G2 that assures that each object module is structured the same across teams. "So regardless of where the team is located, when the module comes in, we know exactly how it is going to be structured, we know where the object definitions are, where the methods are, where the rules are," Stewart says.

The network management team also uses G2 to automatically collect metrics, making it possible to more accurately plan future projects. "Because G2 is a single language environment, and because it's fully integrated with an object repository and has an integrated CASE tool, G2 knows what all the objects are, all the attributes, all the relationships between objects, and how many rules and lines of code there are," Stewart says.

These metrics are automatically collected and stored to a project-wide database that teams can consult when predicting implementation times for projects. Timing, after all, is critical when independently developed components are being pulled together to create a whole.

G2 is frequently criticized because it is so monolithic, coming as it does packaged up with everything you need. But Stewart says that is a big asset when you're trying to get something done quickly.

"You don't have to mess around with things like, 'My compiler won't work with my class libraries. If it does, it won't work with another system.' You minimize accidental complexity," he says.

C++, on the other hand, is simply an object-oriented language, not a development environment. "With C++ there is always the issue of, is the ORB compatible with the compiler, and is the compiler thread-safe, etc." he says.

Although the network management team is one of the bigger advocates of G2, Stewart says G2's popularity is growing. "There are certain functions we know we can build much faster in G2 than with C++."

G2 or no G2, the IRIDIUM system wouldn't get off the ground without the distributed team approach.

Whereas some people see team development as software developers working on different quadrants of a large canvas, Stewart puts it this way: "We try to have one group paint the trees, another group paint the house, another the river, and then we try to put it all together." ■

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COLLABORATION Q&A

Collaboration by Design

Stanford University mechanical engineering professor Mark Cutkosky specializes in finding ways to enable people to collaborate on design and manufacturing projects. He has used the Internet and the World-Wide Web as pillars in some design projects. Cutkosky recently shared his thoughts on the Internet and its relevance to teamwork with Collaboration *Managing Editor Beth Schultz.*

COLLABORATION: As a professor of mechanical and design engineering, how did you become interested in the idea of collaborative work? What's the hook?

CUTKOSKY: I had been working for several years on computer-aided tools for concurrent engineering — that is to say, thinking about things like analysis, manufacturing and manufacturing process planning while the design is taking place. All the ways we know how to do that today involve teams of people with different specialties. We have to get everyone working together, so the question is: How can a computer help teams of people that have to collaborate and share information?

Over the years, our approach to team design has gradually grown more loosely connected, more distributed and more heterogeneous.

We started out with somewhat centralized systems, where all the computer modules shared information in a common database. A computer module could have been a stand-alone program or a person acting through some program. When a person or a piece of software made a change, that change was immediately propagated. What's happened now, and it's happened in parallel with the evolution of the Internet and standards for communications, is that it no longer makes sense to think about software sharing a common central database. We talk about having computer agents that work on the Internet and have their own local databases that translate information into the language used by other agents.

It becomes important to think about things like communications languages, protocols and standards for representing information and so forth. So Enterprise Integration Technologies (EIT) has been interested in generally laying the groundwork for commerce on the Internet, through CommerceNet (see Collaboration, Sept./Oct.'95). It involves not just engineering, which is the application that I am personally interested in, but also things like financial transactions, business agreements and so on over the 'Net.

COLLABORATION: Your work has involved collaborating over the Internet for manufacturing design purposes. What value did the Internet bring to the team efforts?

CUTKOSKY: Instead of the original single organization using a shared database, we talk about a team composed of several subteams — one at Stanford, one at the University of Utah, Carnegie-Mellon, Lockheed, wherever. Well, if the teams are going to be in different organizations across the country, the obvious way to exchange electronic information is to use the Internet.

I guess we became interested in using the Internet about as soon as we decided we wanted to address the problem of having teams that weren't physically collocated. Of course, we were all familiar with things like electronic mail and ftp, but the interesting thing is that at the time we started to look at taking teams, distributing them across the country and sharing design documentation, there essentially was none of this exposure on the World-Wide Web.

I guess this was around 1991, since it was around January of 1993 when the explosion really started taking place. [The Web] just made our lives so much easier. It meant that suddenly there was this robust—sometimes commercial—software that would allow us to post design information and text and graphics and let everybody share it. It made things easier.

The Internet is the underlying structure that allows people to exchange information. Some of that can be done through things like Web pages, text and graphics. But also, we have a lot of activity in which pieces of software are sending messages directly to each other.

There used to be some kind of distinction. The Web was where you put your design data, test results, plots, figures and documentation. Then, in addition to what was on the Web, you had E-mail and direct messages sent by pieces of software and people in the course of doing business. What's happened now is that it is all becoming confounded.

There are programs like HyperMail, which is a piece of software that takes E-mail messages and puts them automatically onto Web pages so that you can quickly scan through them and have them be sorted by date or subject. Or, if you happen to mention a URL in an E-mail message, it will automatically hotlink that. This has confounded E-mail messages and the Web.

Then there are things like JAVA and Hot JAVA coming out, which are sort of confounding computational procedures on the Web. How do you slot off little application programs by clicking on them — just like you would click on a Web page — to essentially download a piece of executable code that does something on your own workstation?

So, the whole idea that the Web is for text and graphics, and E-mail and direct messages are for everything else has become confused because everything is beginning to be integrated.

COLLABORATION: What have you learned from these collaborative design projects about how people work in teams?

CUTOWSKY: That's one of the big issues. We're not really ready to provide computer-aided support for design process management, but I would say we are ready to provide computer-aided support for design project administration. When you have a bunch of people working on a project, all of them have

PHOTOS BY EDWARD CALDWELL

Mark Cutkosky *says that for collaborative efforts to work, team members must understand each other's work environments and organizational behaviour – that means participants must gather for at least one face-to-face meeting.*

their own individual responsibilities but the decisions they make affect other people on the team. It's easy to lose track of some of those alliances.

Our experience is that in a well-managed design project, the important constraints tend to be caught: You've moved the battery, so you have to go notify the guy that's on the other side of the battery that you've freed up some space. But the opportunities often fall through the cracks because it isn't urgent that you take immediate action .

COLLABORATION: What else have you learned from these projects?

CUTKOSKY: There's a class of things we've learned from researching systems and there's a class of things we've learned from human cooperation projects like MadeFast (see sidebar).

On the research side, the kinds of things we've learned have to do with trade-offs between how centralized your models of designs and design processes are, how centralized your databases are and scalability. If all the agents share a common database, then you can do a great deal. If this system runs real fast, you can do a lot of automatic notification and automatic propagation of consequences. But the system tends not to scale very well. It tends to be difficult to add in new people with new interests that haven't been anticipated in the original design.

We're going increasingly toward loosely connected distributed systems. These systems do not do as much automatic propagation of change, of consequences of the design. We learned some important things from working with Lockheed. For example, we learned that real engineers like to work on two or three or four different versions of the design at the same time — they sort of flip back and forth between them. So you have to do some elaborate version control.

We also learned that you can automate as much as you want, but real people want to be in control of the process. As soon as one software agent publishes a result, other agents are notified about it and they could

> *"[The Web] just made our lives so much easier. It meant that suddenly there was this robust software that would allow us to post design information and text and graphics and let everybody share it. "*

Made on the Web, fast

A dot of light skips across a wall and, on a nearby table, a tracking device follows its every flicker. Albeit on a much simpler, non-lethal scale, this is the stuff of which missile sensors are made.

This light-seeking tracker is also at the heart of an exercise in collaborative engineering over the Internet. A team of designers at academic institutions such as Carnegie-Mellon University, Stanford University and the University of Utah joined counterparts at companies like Hughes, Lockheed and Texas Instruments, Inc. to craft this device. They did so under the auspices of the Advanced Research Projects Agency (ARPA), says Mark Cutkosky, product leader and a mechanical engineering professor at Stanford.

"Some folks around the country had all been working on systems that one way or another were supposed to be in support of computer-aided design and manufacturing. We all claimed that we had increasingly open, heterogeneous systems, we were all following standards and our systems were very flexible," Cutkosky says. "So ARPA said, 'Prove it. You claim you have all the stuff that's good for design and letting people form ad hoc design teams. Why don't we see how close we really are to that vision?'"

So hatched MadeFast, the idea being to design and make a prototype for a reasonably complicated, sophisticated electromechanical system in six months using Internet-based tools, Cutkosky explains. The group chose the optical tracker because it is close enough to the seekers on aircraft that people in the defense industry would recognize the project's worth.

"It may have been more fun to do a toy, but then we'd have to go off to people at Lockheed or Rockwell and say, 'See this design project here that used the Internet – why don't you do that?' They'd say, 'Well that's fine for making toys, but we don't make toys, damn it, we make missiles!'"

The MadeFast team relied extensively on the World-Wide Web as a collaborative and archiving tool.

At the project's start, the team leaders set up a Web server with top-level information and pointers to project Webs maintained by various participants. In addition, parallel, interconnected Web pages documented the project as a whole.

Team members gained access to these Web pages via powerful computer workstations, which served as their personal electronic notebooks for recording designs, sketches, memos, meeting notes and other pertinent information. The designers also had access to a variety of other Internet tools and services, as well as several experimental tools from Enterprise Integration Technologies in Menlo Park.

EIT, which helped coordinate the project and Web pages, put together a suite of collaboration tools that were integrated with the Web so they could be accessed just by pointing and clicking.

One of the most handy Internet-based collaborative tools EIT provided was a program called HyperMail, Cutkosky says. HyperMail automatically archived and posted E-mail messages on the Web so team members could see a thread of issues and responses. What's more, Universal Resource Locators (URL) mentioned in the E-mail messages were transformed into hyperlinks, he explains.

Team members also conducted videoconferences over the Internet using the IP Multicast Backbone protocols. But more often than not, teleconferences during which participants fired up their workstations and tapped into the appropriate Web pages were the preferred means of collaborating, Cutkosky says.

Using such tools, the MadeFast team created a working seeker prototype in record time. More importantly, it established a living project Web that can be used again for other collaborative efforts.

—Beth Schultz

immediately wake up and start working on the change. But we don't allow that. Instead, we notify people that something they care about has changed and ask them what they want to do about it.

COLLABORATION: What did you learn about collaborating over the Internet from the MadeFast project, which was focused more on human cooperation than computer interworking?

CUTKOSKY: There was never a group that was more anxious to prove that long-distance collaboration technology would work. We started out with our counterparts at Utah. At that point, we didn't have any Internet-based videoconferencing setup, so we started out with a satellite TV meeting.

I personally thought it was a disaster. It was too formal and kind of stilted. A TV camera doesn't have a very wide field of view, so you only get to see one or two, or at the very most, three people and have a focused talk with them. You don't get to see all the other things that are going on in the background, like the fact that the technician in the corner is rolling his eyeballs at the outrageous commitments being made.

You don't get a very good feeling for the organizational behavior of the participants. You have to be there, you have to walk around, you have to talk to different people to get a sense for not what's officially on the organizational chart, but what's the unofficial organizational chart. There doesn't seem to be any substitute for face-to-face time for gleaning that kind of information.

So after this not-terribly-successful business TV satellite conference, there were a bunch of face-to-face meetings. That's when the project really got rolling. Once we'd done that, then we could do a lot to further the project using E-mail, posting things on the Web and holding occasional desktop videoconferences.

Because videoconferences can be hard to coordinate, across time zones and so on, once you've got everyone there, the best way to use that time is to get commitment from everybody. You have to mandate: 'We shall reach consensus on this issue.' You're not allowed to hang up until everybody says they agree on whatever.

Actually, what worked well many times was just a telephone conference call during which we were all looking at the same Web page on our computer workstations. Having the Web was very useful because everybody was looking at the exact same piece of information at the exact same time.

COLLABORATION: Did you try any other team tools?

CUTKOSKY: We used a data conferencing package from EIT. That was helpful, too, but there were some technical limitations. We were pushing everything, and it was just a little before it was ready to be used on a real project. We ran into some technical problems — like how big a CAD file you can load into a whiteboard before it chokes and dies — with that and some of the shared Mosaic software that forces synchronization between pages on different workstations. But assuming that you had rugged versions that were able to really take complex things and load them in, they could be very good resources.

COLLABORATION: So you advocate some face-to-face meetings?

CUTKOSKY: You have to have at least one. And people from your group have to go to their site, and people from there have to come to your site. And then after that, you can get along very well without much travel.

People at EIT are working on new technology to try to help you assimilate some of the local culture of another organization without you being there in person. What they're drawing on are souped-up versions of MOOs and MUDs, Dungeons and Dragons, and those sorts of things. Imagine having a virtual coffee lounge where you have cartoon images of different people and what they're about. It would also have places where they can post notes about the project and construct some sort of shared project history. That's an attractive idea, but it completely remains to be seen how well that will let people learn what they need to about organizational styles.

COLLABORATION: Did you encounter any difficulties in the teams?

CUTKOSKY: There were terrible problems with documentation. It's clear that when you do distributed collaborative design projects, you have to invest a lot of time on documentation.

We learned that you pretty much have to dedicate someone in your group to be the full-time scribe or librarian. Even with regular engineers doing as much as they can, organizing the information is difficult. You start to build pyramid Web pages, and it gets very easy to get lost in there.

I think in the end, it's going to turn out that if you want to do a collaborative design project with a team dispersed around the country or around the globe, that you will just have to plan on spending more time doing and organizing documentation than you would otherwise. And increasingly, I feel that it's probably more important to adopt a structured design methodology.

COLLABORATION: What does that mean?

CUTKOSKY: Structured design methodologies tend to be adopted by large organizations working on large projects, like JPL designing the next generation of spacecraft or something like that. By contrast, MadeFast was a skunkworks kind of thing — we quickly got together a team of people and told them to very quickly design and prototype something. A lot of the design in the Bay area goes on like that, with a team of people feverishly working on some new product and trying to get it out as soon as possible.

A lot of times, those design projects don't use a formal design process methodology. Now you do this, here's the steps of the design, here's a check-off, here's subtasks under this task. I think that for distributed design teams, you have to adopt those kinds of tools. One reason is to the extent that you do have a structured design process, the computer gets a handle on helping you organize the design documentation.

With that said, we probably don't know what's exactly the right design methodology for virtual design teams formed on the fly and asked to work by collaboration over the Internet. But some more formality is required.

COLLABORATION: How important is the ability to form virtual teams?

CUTKOSKY: It sort of depends on who you talk to. The argument in favor is that what you'd like to do is go out and very quickly find organizations that have a lot more expertise in certain areas.

For example, people are talking about using groups in India for software development. Very good software design teams and very competitive pricing are emerging in India. So people in the U.S. who are working on a new product for which software is an important component may want to suddenly assemble a team with some people from India for software development, some people in California for control systems development, somebody in Taiwan for circuit boards and maybe somebody in Germany for die-cast metal.

That's kind of the dream, but is it feasible?

On the one hand, the idea is that you could assemble this virtual team of the very best people, the very best groups from anywhere in the world for the lifetime of the product development. The real question is: 'Is the advantage you gain by doing that sufficiently large so that it overcomes the burdens of being connected with these different groups?'

It's not just a question of engineering talent. You need to be able to speak their language so you can come to a common understanding of what needs to be done. It's also things like business practices.

COLLABORATION: But what do you think? Will the ability to team across organizations be an imperative going forward?

CUTKOSKY: It really depends on what you're doing. Suppose I wanted to come out with a new kind of robot. I'd have to determine to what extent it would behoove me to flit around the globe and take advantage of expertise in Germany and Japan and elsewhere in the Far East, in addition to expertise in the Bay Area, in order to get my product out.

You have to decide how the overhead associated with doing business with people around the world compares with the benefits obtained by getting access to other groups. Even today, the overhead is apparently not so high that people are unwilling to form international groups to do things. People travel a lot. ■

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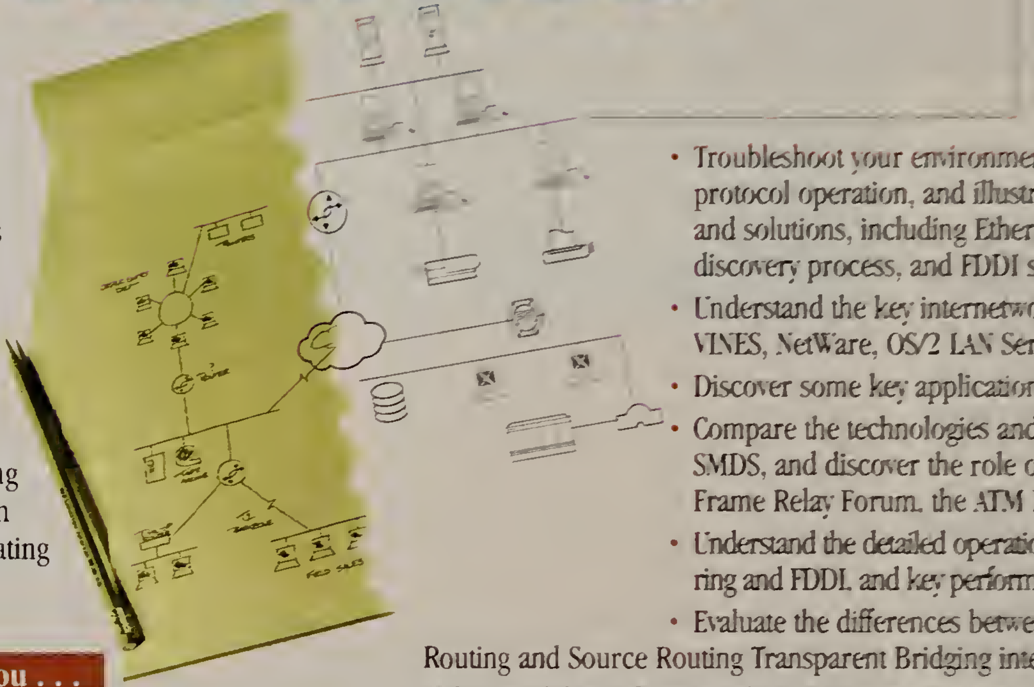

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Drumming up support

By Joanne Cummings

The Sprint/SGI Drums network provides a finely tuned collaboration tool for ad agencies and their partners.

PHOTO BY STEVE GOHNS

Robert Berman of Sandbank Films (left) and Buzz Warren of Grey Advertising (above), *praise the quality of the Drums Service.*

What do dancing Shell credit cards, the Monopoly game and Contact cold medicine have in common? The latest ads for these products were developed with the help of a new Sprint Corp. collaborative telecommunications service called Drums.

Codeveloped by Silicon Graphics, Inc., Drums is designed to serve business communities with mutual interests, simplifying the task of establishing collaborative links between customers and suppliers. While Drums will ultimately serve multiple vertical markets, it is initially targeted at advertising firms.

They can't seem to get enough of it.

Beta users say Drums not only saves them the hassle and time associated with exchanging work in progress via overnight mail, but it also speeds the process of designing and reworking elaborate computer-generated graphics used in ads, resulting in a better end product.

"Using Drums, I get the highest quality work in the shortest amount of time," says Buzz Warren, a senior vice president and deputy director of TV production at Grey Advertising, Inc., a large international ad agency headquartered in New York. "It lets us reach out to different geographical areas to get the best in the business. I'm able to get senior creative input on every project."

Parker Bros.' new ad for Monopoly *was developed using Drums.*

The Drums software runs on a Silicon Graphics workstation that is linked to the Sprint fiber-optic network via a T-1 pipe. Most sites have just one Drums workstation, although Sprint says the service does support LAN connections and that any number of workstations can share the Drums T-1 link.

Once up and running, Drums offers several capabilities, including point-to-point InPerson videoconferencing, a shared whitespace, a shared media player for scrolling and annotating video clips, electronic mail, drag-and-drop file transfer capability and video clip browsing services.

It also provides T-1 access to the Internet and access to content such as Energy Productions, Inc.'s on-line library of stock film footage.

Virtual Reel-ity

When two Drums users wish to review and annotate a piece of film, one sends a copy of the clip to the other via Drums by simply dragging and dropping the file icon onto another screen icon. The software handles the rest of the transfer.

The creative teams at both sites can then play the clip, with Drums synchronizing the delivery and supporting a videoconferencing window that enables the participants to critique what they are watching.

Video is controlled using VCR-type controls — a pause button, a play button, a one-frame advance and a backframe advance, Warren explains. "But what's really unique is either side of the connection can control the clip. When you pause it at your end, it is pausing at the other end on the same exact frame. So it's as if you're in this virtual editing room."

Users can then take a still frame and drop it onto the shared whiteboard to mark it up. If someone at one site circles something that needs work, users at the other site will see the proposed change.

"You can then save it as a document so those mark-ups are with those images, and the next time you screen it, if there's a question as to what was decided, you can call it right back up and look at it again," Warren says. "It's a real argument-ender."

Quality Advantage

Images supported by Drums are extremely high-quality. "We're seeing it in D1 quality, which is the best image quality you can get," says Robert Berman, executive producer of Sandbank Films Company, Inc., a visual effects company in Hawthorne, N.Y. "What makes visual effects so specialized is the need to apply a photographic reality to it, so your reflections and your shadows all have to look authentic. If something looks out of whack, it'll show up in the final product."

Warren echoed Berman's compliments about quality

A drums who's who

A PARTIAL LIST OF CURRENT USERS

- **Crawford Communications,** Atlanta
- **Editel,** New York
- **Energy Productions,** Studio City
- **Fallon McElligott,** Minn. and New York
- **525 Post Productions,** Hollywood, Calif.
- **Grey Advertising,** New York
- **G.W. Hannaway,** Boulder, Colo.
- **J.Walter Thompson,** San Francisco
- **Lamb & Co.,** Minneapolis
- **Manhattan Transfer/Edit,** New York
- **Pacific Ocean Post,** Santa Monica
- **R/GA Digital Studios,** NY, Hollywood
- **Rhythm & Hues,** Los Angeles
- **Sandbank Films,** Hawthorne, N.Y.
- **Western Images,** San Francisco
- **WCPX,** Orlando, Fla.
- **WTDT,** Deerfield Beach, Fla.

Reaching out for help. The user interface to the Drums wide area collaborative service.

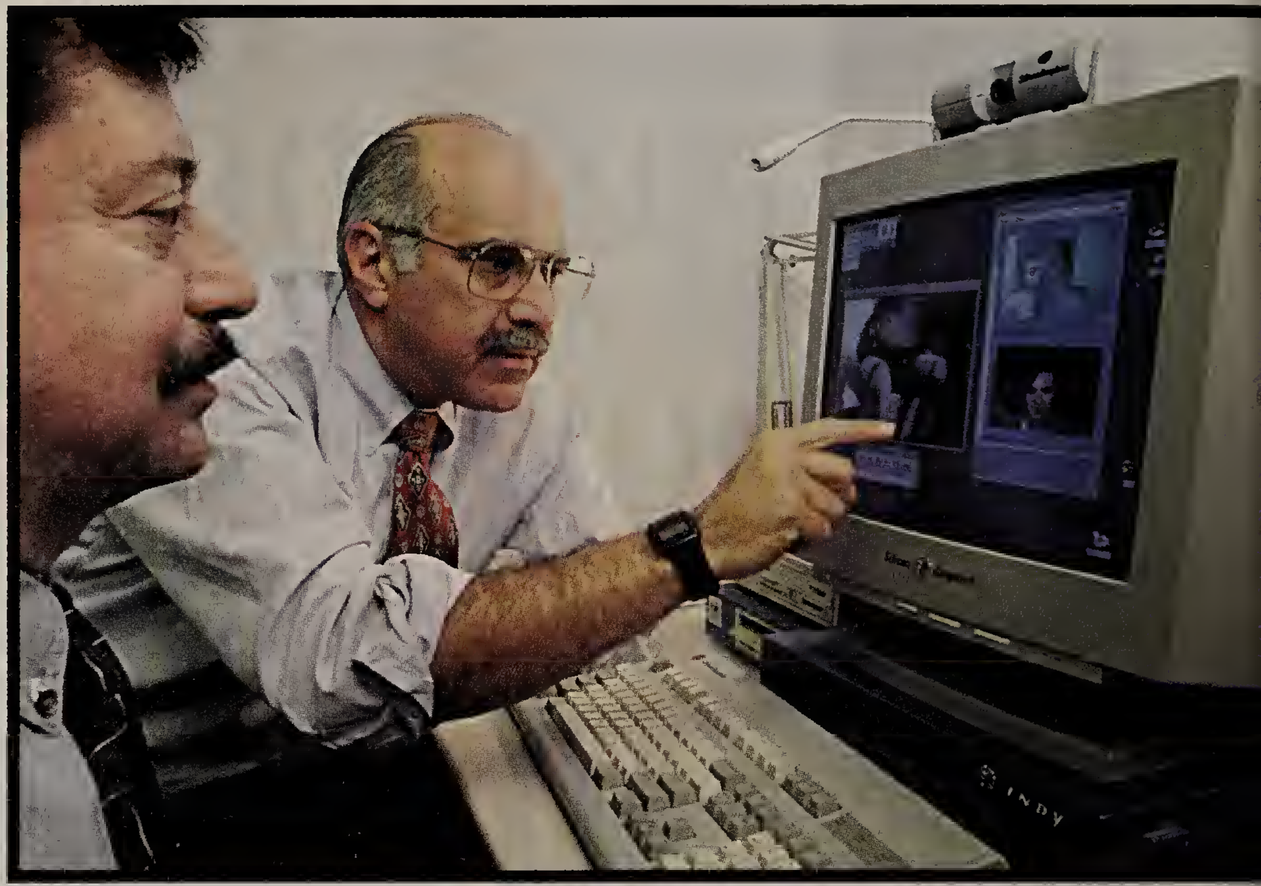
SOURCE: SPRINT, KANSAS CITY, MO.

"We have PictureTel videoconferencing equipment, but that is not something I would use to review a work in progress. While you can send commercials through a videoconferencing system, the quality of the image is not at the level where you can make objective decisions or do critical evaluations."

Image quality can be adjusted to suit the task. Drums supports 30 frame/sec and variable compression, Warren says. "If you have a large file and you just want to look for content, you would send it at a low resolution at a faster speed. But when we're making decisions on a sequence of animation, then we want a high-quality image, and we use a higher compression rate and the picture we receive at either end is as high a quality image as you can get."

Flat fee

Because the T-1 link to the Sprint network is leased for a flat monthly fee, the network is always available. "You don't have to pay any usage charges," Warren says. "It's a flat fee, and you can use it as much or as little as you like."



Last minute tweaks *Executives from Grey Advertising collaborate on an ad using the Drums network from Sprint and Silicon Graphics.*

The total cost for getting a site up and running on Drums is less than $3,000, according to Joseph Katz, systems manager at R/GA Digital Studios, a visual effects and motion graphics design house that is also beta-testing the network and helped design the software's graphical user interface. Upfront costs cover the purchase of a Silicon Graphics workstation and service installation.

Katz says the overall savings from using Drums is difficult to quantify. "There are so many factors," he says. "But if it can save you one trip a month, then it's paid for itself."

Others agree. "You are saving money because you are more efficiently using people's time," Warren explains. "It's impossible for the creative director to be at every location [around the country], but it is possible for him to come down to our workstation, spend 15 or 20 minutes evaluating a piece of work and discussing ideas over this teleconference. And that kind of input is invaluable".

Downsides?

While pleased overall, beta users have wish lists, some of which are already being addressed.

"We got involved in this when it was such a new product that I don't think everybody had worked out the initial teething pains," says Sandbank's Berman.

"But since then, Sprint has really geared up a big effort to support this and do it right. Sprint is now providing on-line training and on-line customer service. We can bring up one of their customer service people anytime we want and get assistance if we hit a snag or we have a problem."

Another area of concern is the reach of the network, which is only available in the U.S. Sprint is expected to roll out an international version of Drums shortly.

"The big thing we're looking forward to is the international connection," Warren says. "We have many offices in Europe, Asia and the Pacific, and it takes more than a day to ship material across, between clearing customs and getting from one place to the next. And then trying to hook up with the people at the other end because of the different time zones, it becomes a logistical nightmare. That is a ripe opportunity for something like Drums."

Security is also a factor, Katz says. "They don't provide you with a firewall when you get the service, so you need to set that up yourself. It's not so much to protect yourself from hackers on the Internet; it's more to keep yourself secure from other Drums users."

Sprint is expected to provide some kind of router-based firewall for the service, but declined to provide a time frame.

Another question is whether the service will be able to achieve the critical mass needed to make it really useful. "Right now, they have about 30 users on Drums, and that's just a small fraction of the industry," Katz says. "We're hoping to see that number jump significantly when it becomes commercially available."

Others agree.

"I believe that everybody involved in the production process should be on the Drums network," Grey's Warren says. "I'd like to see music houses and composers on the network. And to that point, I'd like to see casting directors. Maybe we can get some head shots very quickly to streamline the casting process for commercials."

But wish lists aside, all agree that services like Drums are becoming a business necessity.

"I'm convinced that it will be Drums or a Drums-like network that we all begin to operate on in a very short time frame," Warren says. "I believe this is inevitable because it just makes sense — better commercials faster."

Just what we all need. ■

Cummings is a freelance writer in Marlborough, Mass. specializing in network issues and trends.

Drums vs. the old way

Drums might just put the overnight delivery services out of the ad business.

"We did a shot recently where we needed a bottle to move," says Robert Berman, executive producer of Sandbank Films Company, Inc. in Hawthorne, N.Y.

"A company we work with on the West Coast hired an animator to come in and cell animate, frame by frame, how that bottle was supposed to move. And when those images were put together to create a 2.5 to 3 second line test, it was sent across to us on Drums and we were able to see it in a matter of minutes.

"So rather than waiting for an overnight shipment of a video cassette and then having to messenger that cassette over, and try to get people to look at it and approve the movement, we were able to do it almost instantaneously."

Grey Advertising, Inc. says that Drums saved it a week's time over the old overnight delivery method. "We made four changes in one day using this," says Buzz Warren, senior vice president and deputy director of TV production at the company. "Without Drums, it would have taken four to six days, depending on how long it took to get the cassettes back and forth."

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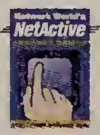

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COLLABORATUS *To have labored together*

Will the Web kill Notes?

BY JEFF HELD

Rumors about the imminent demise of Lotus Notes are greatly exaggerated

I get calls almost every day from someone in the press asking that question. I've recently read articles in *InfoWorld* and the *Wall Street Journal* (the latter being particularly uninformed) suggesting that the party is over for Notes because the Web will sweep it aside. After all, the Web is already taking over banking, retail, software distribution, electronic commerce, publishing, entertainment, grocery shopping and it makes wonderful julienne fries.

The volume of hype and misinformation on this topic is deafening.

The problem is that most of what you hear and read is dead wrong. The Web is not a direct threat to Notes, at least not any time soon. In fact, the Web could be the best thing that ever happened to Notes. At the very least, the two are complementary and will be increasingly used together.

Notes got its start by supporting fairly simple collaboration using discussion databases and E-mail, which are capabilities provided by the Internet today. The misperception that Notes is still simply a discussion database is, in my assessment, the principal reason for all the noise.

Notes has evolved into a far more sophisticated product that goes light years beyond the simple document sharing and publishing capabilities offered by the Web. Release 4 of Notes is a serious application development environment with excellent security, data management, document management and system management capabilities.

Notes 4 will be a serious contender for all sorts of applications that heretofore required professional development tools such as C++, PowerBuilder, etc. And Notes developers will be able to build many of these applications in a fraction of the time than would normally be required. Even with Java, there is nothing in current Web technology that is remotely close to the capabilities of Notes Release 4.

The great attractions of the Web are worldwide access, open standards and low cost. (I feel obliged to note that the "low" cost of the Web is due to the billions of dollars invested by the government.)

The Web has been successful because it does not attempt to do everything for everyone. It provides a nice graphical environment for publishing and sharing information, and it supports all platforms. Let's face it, 99% of what happens on the Web today is browsing and downloading. Nice and useful, but not exactly rocket science.

To become a real competitor to Notes, the Web must be capable of supporting complex business applications in a secure and reliable fashion.

Just look at what's happening in electronic commerce. Major companies (Microsoft, Visa, Mastercard, et al.) are trying to devise methods to secure electronic payments over the Web, so far with limited success.

What about reliability? Remember, nothing on the Internet is guaranteed. Although the Internet backbone is pretty reliable, sites vary. And Internet congestion is a problem that won't go away since there is no Internet "traffic cop."

Then there is the matter of developing applications. HTML is great, but you can't use it for much else than browsing. To develop apps requires the developer to drop into more conventional tools like C or C++ using the CGI interface, or SQL gateways like WebDBC, or perhaps Java, which is itself derived from C++.

The problem is that it is much more difficult and time-consuming to develop Web workgroup applications needing replication, remote access, data security, mail enablement and legacy system access, than it is with notes.

When to use what

Right now, I see different uses for Notes and Web technologies. Organizations that are primarily interested in publishing information and sharing files, and nothing else, are better off with the Web. It is less costly, readily available and widely used.

The competitive threat here is not to Notes, it's to the low-end groupware products like FirstClass, Open Mind, and the like. Organizations that use Notes for this purpose are not getting their money's worth and would be better served by using the Web.

Organizations that need to do more sophisticated things or require replication, disconnected use and tight security are better served by using Notes. Once you go beyond information sharing, Notes is clearly superior today.

Why not use both?

Perhaps the ultimate answer is to use both Notes and the Web. Notes Release 4 will be very Web-friendly and allow users to develop sophisticated business applications that use the best of both worlds. For example, Release 4 will allow developers to include browser-like functions in Notes applications, providing hotlinks from Notes objects to Web pages.

And today, InterNotes Web Publisher (Version 2 just shipped) is one of the better ways to manage the publication of documents to the Web and supports two-way information exchange between Notes and the Web, and forms-based transaction applications.

Using Notes for editing, updating and publishing documents to the Web is very appealing, especially in large decentralized organizations where even the task of collecting information is daunting. For sophisticated Web applications, Notes might turn out to be an attractive development environment.

So what do you choose, Notes or the Web? The point is it just isn't that simple. These technologies are different and users do not need to choose one or the other. Both are likely to survive and prosper. Organizations that make simplistic choices, either way, are likely to regret it.

Next column: Why doesn't Microsoft understand groupware? Also, an update on the IBM/Lotus merger.

Held is a Partner in the Center for Technology Enablement at Ernst & Young LLP.

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Circle Reader Service **#29**

Large-scale workflow deployments still entail more work than flow

By Barb Cole

The U.S. Navy's deployment of a 200-user workflow system resulted in the creation of a new position: a workflow coordinator responsible for making sure that workflow jobs and business processes stay on track.

"I thought the software would run by itself, but we found we really needed someone to mother-hen the business processes," said Judith Oliver, Navy Seawolf Program manager.

Such revelations are common among the growing group of companies trying to deploy workflow applications across enterprise networks.

Large-scale workflow applications are becoming more practical because the cost of workflow software has declined (see graphic). In addition, more vendors are putting workflow features into desktop software, making it easier for network coordinators to hook end-user desktops into workflow engines from common applications.

But deploying workflow to hundreds of users presents its share of challenges. Interoperability between workflow systems is weak, and image-intensive workflow applications can strain nets when deployed beyond workgroups. In addition, the databases on which workflow systems are based are prone to bottlenecks when the number of transactions or users soars.

Another challenge faced by companies deploying workflow to hundreds of users is that they typically need to distribute the application across multiple servers, creating the need to keep several databases in sync.

What's more, while software costs are dropping, workflow systems typically require fairly powerful Windows-capable PCs, a far cry from the mixture of older PCs and 3270 emulation terminals that still permeate most large organizations.

Interoperability obstacles

Despite the efforts of the Workflow Management Coalition, a consortium of vendors and users charged with developing interoperability standards between workflow systems, most users still struggle with getting workflow to snap-in with existing applications.

The lack of interoperability between an existing ViewStar Corp. document management system and a workflow application from Keyfile Corp. required that the Navy develop its own interface to unite the two workflow applications, which are used to automate correspondence between shipbuilders and the Navy at five sites.

"We had a similar [interoperability] problem with [Lotus Development Corp.'s] cc:Mail," Oliver said. "We couldn't get the [Keyfile] cc:Mail interface to work, so now our users have one [mailbox] for Keyfile and one for cc:Mail."

Jim Bair, research director at Gartner Group, Inc. in Santa Clara, Calif., said even though the Workflow Management Coalition should be applauded for developing workflow-to-workflow interoperability standards; the standards will do little good until those linking workflow applications with common desktop applications are also in place.

But, the consortium recently produced its first standard that defines how client applications interact with workflow engines, and several more standards are in the works that would foster better workflow integration with existing applications.

Distributed workflow

In addition to interoperability glitches, many workflow systems are unable to support more than about 100 users per server. As a result, users must distribute the systems to achieve scalability — a task that is generally more complex than with traditional client/server applications because workflow software lacks replication utilities and built-in management tools. "We have 600 users at eight sites, and each site has its own server," said Ed Glister, senior project manager at Consolidated Edison Co. in New York. The company uses a Wang Laboratories, Inc. workflow application to automate customer correspondence and handle other customer service functions. With such a configuration, "scalability really isn't a problem," he said.

In Con Ed's case, the utility replaced its OS/2-based databases with Microsoft Corp.'s SQL Server for Windows NT to ease the management of the distributed servers. "[Windows] NT has a lot of built-in features that help [measure the workload of the workflow application]," according to Glister.

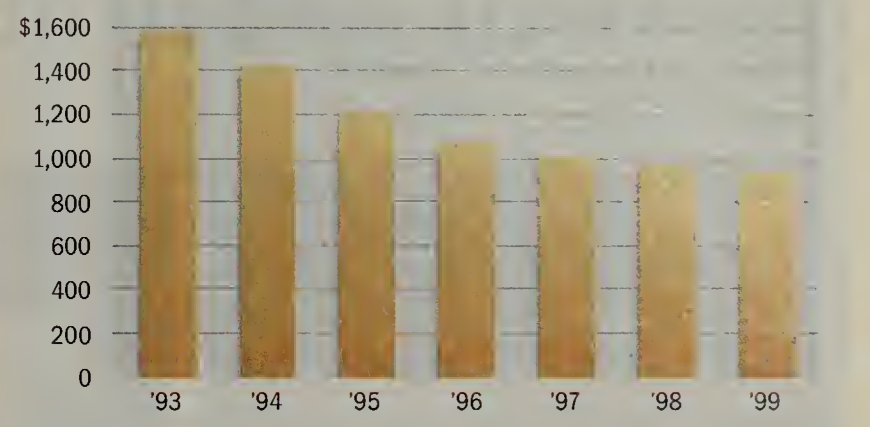
DST Systems, Inc., a mutual funds service bureau in Kansas City, Mo., chose a more centralized approach so as not to have to worry about managing multiple servers. It has two workflow applications with about 1,000 users each running its own Automated Work Distributor software. "In both environments, we have a single database," said Matt Graver, systems officer at DST. "The implementation we've chosen is simpler [than a more distributed architecture] because there are fewer moving parts."

Most users said large-scale workflow systems are complicated by the fact that they tend to span multiple business processes, which makes system design difficult.

"Probably the biggest issue we have is the initial design of the routing of the documents," said Vince Carney, vice president merchandise accounting controller at Price Costco, Inc. in Kirkland, Wash. He has implemented an imaging system to track accounts payable and is now looking to add workflow capabilities. "Each document is different and we have a lot of rules for handling various exceptions," he said. ■

WORKFLOW BECOMES MORE AFFORDABLE

The cost per seat for production workflow applications will be under $1,000 by 1998, according to consultancy GIGA Information Group in Norwell, Mass.



GRAPHIC BY TERRI MITCHELL

TOP PRODUCTION WORKFLOW APPLICATION REQUIREMENTS

- Speeds up the process
- Scales to hundreds of users without degrading response time
- Works with legacy applications
- Runs reliably
- Has an easy-to-use interface
- Employs a rich selection of rules for routing work
- Supports document indexing, retrieval and viewing tools

SOURCE: GIGA INFORMATION GROUP, NORWELL, MASS.

IBM polishes up FlowMark

IBM next month will ship Version 2.2 of its FlowMark workflow software, which will include changes that make it easier to manage business processes across a network.

IBM also will announce details of a new business process modeling tool, which will include a methodology for analyzing and defining business processes, according to Susan Schwartz, IBM's FlowMark program manager. FlowMark will be able to read the models created by the tool and determine how existing applications can fit into the workflow operations defined by the models.

Version 2.2 will introduce Service Broker Manager (SBM), a utility that lets FlowMark connect with another application and repeatedly use its services.

In the past, each time such a remote service was needed, the application had to be reopened, a time-consuming and resource-intensive process, Schwartz said.

Included with SBM will be code specifically developed to work with Lotus Development Corp.'s Notes and IBM's ImagePlus VisualInfo, which is software for imaging services and libraries. Via SBM, users will be able to invoke Notes from FlowMark, as well as start or stop a FlowMark process from within Notes.

The new release also will let users break out a single process, such as customer service, into subprocesses, such as technical support or shipping, that can be run on separate remote servers. This distributed process support will let the workflow user centrally manage the overall process but run key subprocesses wherever they are most useful or efficient, Schwartz said.

Also new will be a worklist API based on part of the Workflow Management Coalition's draft standard for managing workflow processes. Using the API, FlowMark developers will be able to customize how end users see the worklist, which outlines the steps needed to complete a given process.

By mid-1996, IBM will introduce the FlowMark server on HP-UX and Windows NT, and FlowMark run-time clients on Windows NT and Windows 95.

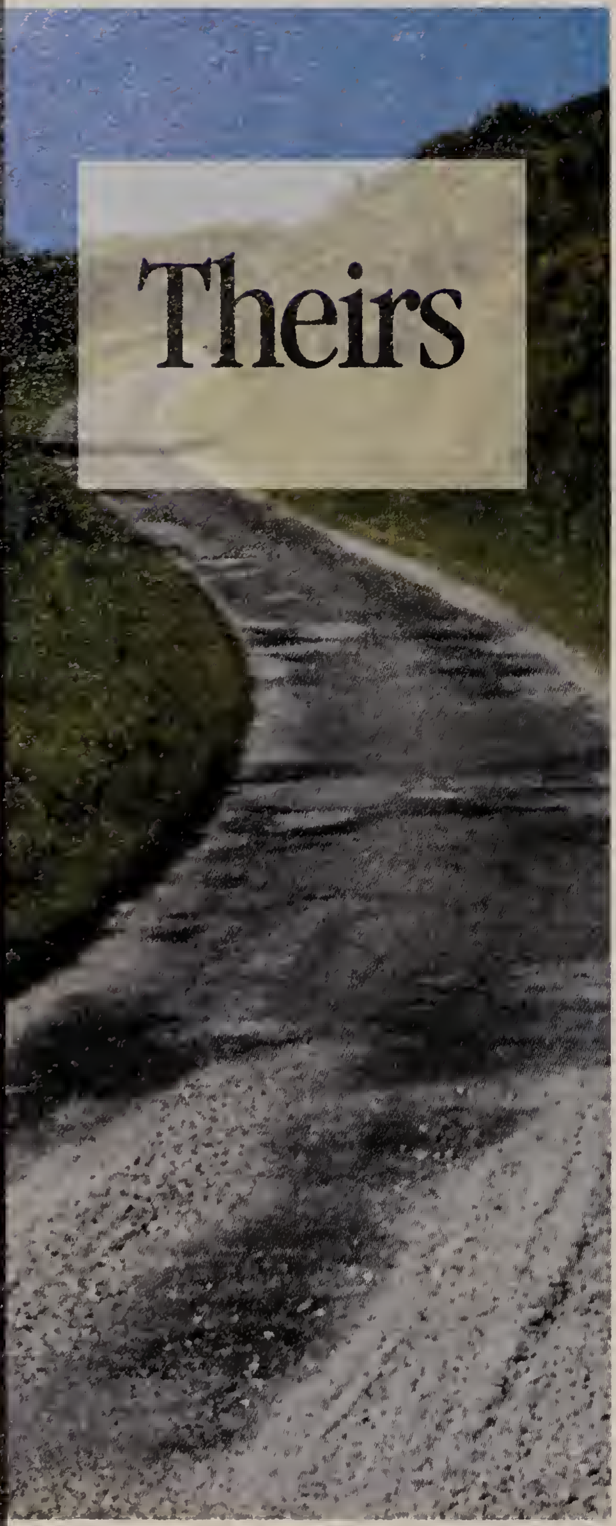
Also due this year will be the new business process modeling tool, and near year-end, the ability for FlowMark to use IBM's MQSeries messaging product for reliable message-based communications.

Version 2.2 will cost $695 per user. It will be available on OS/2 and AIX servers, as well as on OS/2, AIX and Windows clients.

IBM: (800) 426-2255.

—John Cox

Which is the best route for your company's Internet traffic?



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Circle Reader Service #42

Electronic Commerce

Covering: Tools and Techniques for Interenterprise Networking and Doing Business On-Line

Briefs

CE Software, Inc. *is distributing free beta copies of WebArranger, a utility that* **tracks user-designated Internet sites** *for changes and new information. WebArranger, which runs on Macintoshes, works with common browsers and can annotate bookmarks. WebArranger can be downloaded from http://www.ccsoft.com.*

CE Software: (800) 523-7638.

US Order *has introduced Electronic Merchant Center, a* **billing workstation** *that helps merchants send monthly statements to customers across the Web. Scheduled for second-quarter availability, the system will support VISA Corp.'s E-Pay standard for paying bills electronically.*

US Order: (703) 834-9480.

InterCon Systems Corp. *is shipping InterServer Publisher, a $495 Web site manager with* **integrated FTP and Gopher** *functions for use on Macintosh systems running MacOS System 7.*

Also shipping are updates to both the Macintosh and Windows versions of InterCon's $495 TCP/Connect II browser. TCP/Connect II Remote for Macintosh systems only is available for $195. InterCon expects to add a Domain Name Server this quarter.

InterCon: (703) 709-5500.

IBM *has revamped rates for its Internet Connection access service,* **eliminating a $19.95 registration fee.** *Rates range from $4.95 per month for three hours, plus $2.50 for each additional hour, to $29.95 per month for 30 hours, plus $1.95 for each additional hour.*

IBM: (800) 426-3333.

Spider Island Software, Inc. *has updated its TeleFinder bulletin board system software to support Web documents and a POP3 mail server. TeleFinder 5.0 is* **Java-ready** *and supports HTML commands. The software costs $675; upgrades for TeleFinder 3.0 users are $95 and free for TeleFinder 4.0 users.*

Spider Island: (714) 453-8095.

Internet provider UUNET expands service options

By Peggy Watt

Fairfax, Va.

Pioneer Internet service provider UUNET Technologies, Inc. is revamping and enlarging its commercial Internet services with dedicated Web servers and more site options.

UUNET's focus has always been business-to-business services, and the new offerings are intended to enable the construction of Web sites for firms ranging from multinational corporations to neighborhood shops.

ON-LINE

Take a gander at a map of UUNET's backbone. From the main menu select News+ then Electronic Commerce.

Network World Fusion
http://www.nwfusion.com

The new services include a secure Web host option, which supports server-based Secure Sockets Layer, dedicated server support, File Transfer Protocol (FTP) hosting, and expanded reporting and statistics functions.

NetCity, an electronic city complete with businesses, runs on UUNET systems here, but its operators work from San Juan Capistrano, Calif. Cofounder Sheri Brooks said NetCity will switch to UUNET's new 10M bit/sec premium service to accommodate the growing number of visitors. The secure Web hosting service also will support NetCity's on-line shopkeepers.

"We're reworking our order forms so our clients can handle sales directly on-line with this new security," Brooks said. NetCity, at http://www.netcity.com, has been operating little more than a year but draws nearly 200,000 hits per month by shoppers browsing the storefronts.

NetCity is one of more than 400 Web sites running on UUNET's bank of Pentium 130 systems with 80M bytes of RAM on a 100M bit/sec FDDI ring.

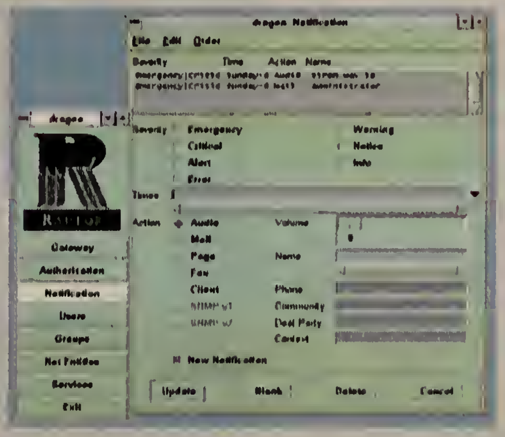
UUNET's dedicated server option gives customers sole use of a Pentium system. Hosting is available in standard T-1 services, which start at $300 per month, and premium, which start at $900 per month.

The reporting service provides a summary report of Web site visitors, including their domain names, company names, states of origin and even zip codes.

The FTP host option was added at customer request, said Paul Hoffmann, product manager for new business development. Its pricing starts at $100 per month for up to 2,500M bytes of traffic.

UUNET: (703) 206-5600.

SITE-WATCHER SCANS FOR TROUBLE



This Suspicious Activity Monitor is part of Raptor Systems, Inc.'s Eagle application-level firewall product line. The Waltham, Mass. firm is implementing its Unix-based products on Microsoft Corp.'s Windows NT. The first component is the domain-level Internet security, scheduled to ship by mid-February. The workgroup and LAN security components and support for nomadic or remote systems are in development. Prices for each component begin at $6,500 for a 50-user license. Raptor: (617) 487-7700.

BUSINESS SPACE

The truth must be told: The 'Net is lame

Some friends of ours came over for dinner last weekend. Now these friends are not computer-literate. So I waxed lyrical about the Internet. I said, "This is way cool; you're going to love this stuff!" and showed them some hot sites and some Java applets.

Mark Gibbs

Their response was along the lines of "So what? Our kid's Nintendo system is more interesting."

And you know what? They were right. The Internet is lame. That's right, you heard it here first. Lame.

I thought about this a lot, and the result is my top 10 reasons why the 'Net is lame:

10. Flaming. I am so tired of seeing people flame each other. I've seen flames in the last couple of months on every list I subscribe to. Guys, lighten up. Give up that getting-even, putting-people-in-their-place thing. It is childish. And lame.

9. Performance. The 'Net as a whole seems to be slowing down even though every carrier is increasing its bandwidth. These delays are why Domain Name Service lookups fail more often these days. And there are more outages than ever. Lame.

8. Sites "under construction" or "Last updated on June 1, 1993." It shows that you are not committed, not focused and/or not organized. This is very lame.

7. The missing links. So many Web sites kick up 404 messages because their managers have reorganized the site, moved it, or have simply not checked to see if their links work. This frustrates and irritates. This should be a punishable offense.

6. The Domain Name Service. DNS needs to be replaced as soon as possible. All of this .com stuff is unnatural. I want my company to be found by its name — Gibbs and Co. — not under the techie and obscure gibbs.com. Give me X.500.

5. Advertising rather than content. Why is it that Web site owners think that the kind of junk they put on real-world ads has any more chance of success on the 'Net? Death by metaphor, irrelevant images, corporate content rather than selling — the litany of sins goes on and on.

4. Junk E-mail and spamming. Not much needs to be said about these obnoxious practices other than that the perpetrators should be slapped and sterilized. And "Lame" should be tattooed on their foreheads.

3. Newsgroups. About 99% of newsgroups should not exist. Sophomoric, argumentative and frequently so puerile that you wonder whether the contributors are brain-damaged, many newsgroups are so far beyond lame that they are pathetic.

2. Internet service providers. In general, most of the service providers just don't get it. The Internet is becoming a consumer environment, and premium pricing with lousy support doesn't work and never has. Harsh commercial reality is going to tidy up the ISP market in the next 12 months. And not a minute too soon.

And No. 1 is...

Internet user software. Sure, there's some cool ideas and applications out there. But most browsers are somewhere between lame and appalling. Much of the software is fragile. And dialers suck. And the user interfaces are as user-friendly as a cornered rat. And, and, and ... the sad fact is that software for Internet users is unbelievably lame.

I am sure this will all get fixed eventually. Until then, we'd better just face it: The Internet is lame.

Let me know your top 10 at mgibbs@gibbs.com or call me at (800) 622 1108, Ext. [illegible]. I'll send a prize for the best list.

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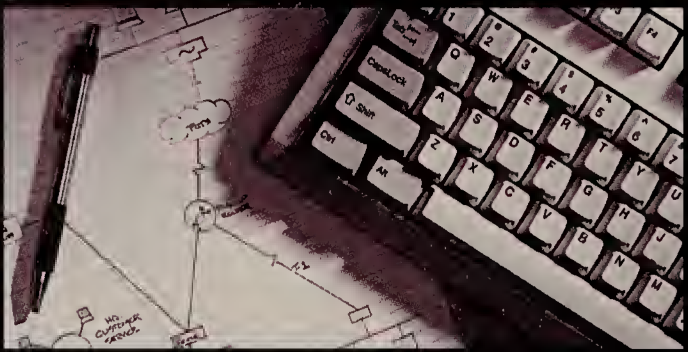

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What is the tag number for Abstract Syntax Notation One (ASN.1) UniversalString/ISO 10646?

Peter Waters, London

UNIVERSAL 28, says Bancroft Scott, president of Open Systems Solutions, a software development company in Princeton, N.J.

There's also a subset of UniversalString called BMPString, which is often used in newer standards. The tag for BMPString is UNIVERSAL 30.

BMPString uses 2 bytes of data for each character, rather than the 4 bytes per character used by UniversalString. Because BMPString requires half as many bytes per character as UniversalString, it is probably a good idea to define ASN.1 specifications to use BMPString.

For more information on tags and how they are used, visit Network World Fusion on the World-Wide Web at http://www.nwfusion.com and select Forum, Help Desk, then ASN.

For security reasons, I am trying to delete SLIST.EXE from the SYS/LOGIN directory to prevent NetWare users from accessing the server list when they are not logged in. However, I can't seem to delete an SLIST.EXE file from one NetWare 3.12 server. Can you help?

Jonathan Shin via the Internet

To restrict access to the SLIST.EXE file, you need to move it from the public directory to the system directory on the server says Michael Luchini, a Certified NetWare Engineer and private contractor in the Worcester, Mass., area.

Before moving the file to the system directory, you must be logged on as the supervisor.

From the public directory, enter the command COPY slist.exe F:\SYSTEM. Next, type "Flag slist.exe +rw," which turns on the read/write flag and enables the deletion attribute of the file. Then type "DEL slist.exe." You might also want to check the login directory for a duplicate copy of the U.C. file.

Architecting ATM switches for ABR service

By Kambiz Hooshmand

Not that these aren't important now, but an Asynchronous Transfer Mode switch's buffer size and congestion control capabilities will become highly critical when available bit rate (ABR) service hits the network.

ABR service, due for standardization by the ATM Forum this quarter, is aimed at economical support of applications with vague requirements for throughputs and delays. ABR service can support this type of traffic because it uses feedback mechanisms that help control the rate at which traffic enters the network and give users dynamic allocation of bandwidth.

The buffer zone

Early wide-area ATM switches did not have buffering schemes that could adequately handle bursty loads, such as those that will be found with ABR service, in the presence of different traffic types. Because the buffers were way too small — they only handled hundreds or thousands of cells — certain classes of service resulted in large cell losses or unacceptable delays and jitters.

ATM switch vendors now generally accept that buffers on the order of 25,000 cells per port are required to simultaneously carry multiple classes of traffic over a single DS3 ATM WAN port. Yet big buffers alone will not future-proof ATM switches so they can smoothly handle the elastic, bursty applications that will use the ABR service.

The switches also need appropriate feedback mechanisms and queuing architectures.

ATM switches must guarantee a minimum service level to each user and traffic class when the network is heavily loaded and provide fair access to excess bandwidth when traffic is light. While large buffers lower cell loss and improve service quality, they do nothing to provide fair access to excess capacity. Here, the buffer architecture becomes as critical as its size.

Many ATM switches divide available buffer space among a number of first in, first out queues into which many users' traffic is mixed. Under such schemes, users still must contend for a shared, though not sole, resource. And since no effective policing mechanism is available for ABR, one user can unfairly consume much of the available buffer space and leave all other users to share limited unused buffer space.

One, queue, three

Alternatively, some switches send each user's traffic into individually managed queues, effectively creating firewalls between users by separating one virtual circuit from another. This means one user cannot unfairly grab buffer space from another user.

Under this architecture, each queue has its own traffic metering system so that the rate at which a user can send traffic into the network is controlled. With ABR service, users can adjust their submission rates based on the feedback network switches send to endstations. Switches can notify endstations of congestion by setting the Explicit Forward Congestion Indicator bit in the cell header or via Backward Rate Marking.

With Backward Rate Marking, switches send and receive feedback messages, but they do not actually control congestion. The endstations must slow the cell rate.

The ATM Forum details how switches themselves can actually control congestion in Version 4.0 of the User-Network Interface specification. The technique is called Virtual Source/Virtual Destination (VS/VD).

Start, stop, start, stop

A VS/VD switch acts like a virtual source in one direction and a virtual destination in the other direction.

In other words, the source sees the switch as the destination and the destination sees it as the source. This allows creation of a closed, manageable feedback loop: The switch can not only send and receive feedback messages, but also act on those messages by increasing or decreasing the connection rate.

By terminating traffic at the first ATM switch in the network, service providers can be assured that no matter how ill-behaved the upstream LAN devices are when sending traffic, they can still build firewalls between users and properly meter the cells. Since the end-to-end traffic can be terminated and segmented several times across the network, the forum calls this approach segmented VS/VD.

The full implementation of VS/VD requires per-virtual circuit queuing and rate scheduling, or traffic metering. Individually queued virtual circuits also must be metered on their own, otherwise they can gain unfair access to the network if fed by a constant, ill-behaving source. This is particularly important for ABR since this service dynamically allocates bandwidth.

When a connection is metered individually, its rate scheduler can respond to the closed-loop congestion control feedback built into ABR by decreasing or increasing cell rate. If a user ignores feedback messages requesting a slowdown in the cell rate and continues to send large amounts of traffic into the network, those cells will back up into their own individually managed queue. Other users will not encounter any unfairness or resource limitations.

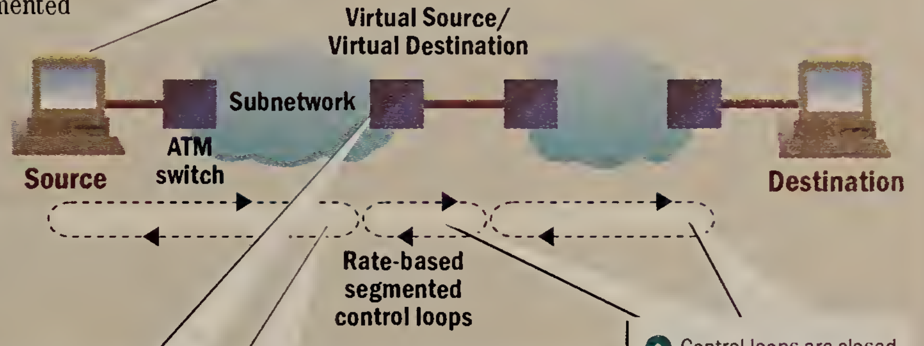
So rate scheduling, in conjunction with sophisticated buffering schemes, will enable ATM switches to deliver equal and dynamic access to bandwidth.

HOW IT WORKS

Segmented VS/VD

For available-bit-rate (ABR) service, some ATM switches use a segmented Virtual Source/Virtual Destination (VS/VD) scheme to create feedback loops between the sending and receiving points. This lets switches exchange information about congestion and adjust the cell rate.

1 A source sets up an ABR connection and sends cells, including Resource Management (RM) cells, into the network at a specified rate. It sees the first segmented VS/VD ATM switch as its destination.



2 The VS/VD switch can slow traffic by marking and returning the RM cells over the control loop. Acting as a virtual source, a switch reads the RM and slows down the rate at which cells are transmitted.

3 Control loops are closed and new ones are initiated by intermediate switches functioning as destinations and new sources.

Hooshmand is director of engineering at StrataCom, Inc., a San Jose, Calif., provider of ATM switches. He can be reached at (408) 294-7600.

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EDITORIAL INSIGHTS

Web of hate: Part 2

Our "Web of Hate" story (Jan. 8, page 1), which focused on hate groups using the World-Wide Web to disseminate their ideas, has sparked wide debate on issues of free speech and censorship.

As we reported, The Simon Wiesenthal Center, a Jewish human rights group, is issuing letters to hundreds of colleges and Internet service providers, asking them to embrace a code of ethics barring hate groups on-line.

The code states: ". . . we consider it our civic duty to refuse service to those individuals and groups who seek to use this technology to mainstream their agendas of hate."

The effort drew heated response from opponents in follow-up articles by *The New York Times* and the Associated Press (AP). In fact, it was a bit frightening to see the concept I espoused last week — that of the Internet as a marketplace of ideas — being echoed by a Holocaust revisionist quoted by the AP.

Free-speech proponents use the standard First Amendment argument to lambaste The Wiesenthal Center's Code of Ethics. But the center's Rabbi Abraham Cooper turns that argument on its head, saying the First Amendment protects publishers — read "service providers" — from having to publish material they deem unsuitable for their audiences.

Do service providers have a responsibility to monitor what's carried over their networks, or are they simply blind conduits?

This is not an ethereal political issue. As you bring your business on-line, you become a service provider and could be held responsible for what someone else labels offensive material that's posted by your employees or others who use your facilities. Should you adopt a code of ethics? Should your Internet service provider?

On a personal level, I'm against efforts to pressure on-line service providers into adopting a standard code of behavior. It chills free debate and violates the very nature of the 'Net. Internet providers have to make their own decisions about serving customers — and must be prepared to deal with the economic consequences of carrying material that others find offensive. Customers can vote with their feet, as the saying goes.

What do you think? Drop me a message and do it fast, before Congress adopts its own 'Net censorship rules.

John Gallant, editor in chief jgallant@world.std.com

Teletoons

By Phil Frank and Joe Troise
guru@well.com

Name's Billy the Hacker... he can shoot Netscape fulla' holes faster'n the average nerd can boot up!
Phil Frank

REALITY CHECK

Traffic from other services can help you make the case for ATM — for now

Thomas Nolle

What's the big issue in Asynchronous Transfer Mode today? Is it APIs or which LAN Emulation standard will win out? No, it's how carriers will justify the cost of deploying ATM services when the demand for such services is almost negligible.

As CompuServe, Inc.'s recent decision to deploy StrataCom, Inc.'s BPX ATM switches in its network shows, ATM may get some help from allied data services. But such aid may come at a price.

CompuServe's move was interesting because it was deploying ATM switches not so much to offer ATM service, but to do a more efficient job of transporting non-ATM services. In CompuServe's case, the StrataCom BPXs were justified by CompuServe's own information network, its frame relay and X.25 public networks, and its Internet access traffic. ATM, CompuServe indicated, would come later.

The positive side of this announcement, from an ATM perspective, is twofold.

First, it shows that a big player in the network arena believes ATM can be useful in carrying a wide variety of data traffic. For owners of private networks with no immediate plans to empower workers directly with ATM, this proves the technology can still serve a valuable purpose.

By making data transport more efficient, ATM switches can be justified in the near future and later exploited to offer ATM to the desktop, if desired. Users want an ATM migration option, but most do not want to start migrating today. If ATM can be justified in a transport network without any ATM users, that migration option is assured.

Second, the deal proves that carriers can deploy a fairly rich ATM infrastructure in the near future before any significant ATM service demand develops. That, in turn, could assure reasonable ATM pricing and competition, as well as widespread ATM availability.

In fact, most of the current ATM switch deployment by carriers has been justified by services other than ATM. Sprint Corp. and AT&T both share some backbone network facilities between frame relay and ATM, with Sprint providing most of the traffic.

CompuServe's move validates that approach. But while these signs bode well for ATM, there are other signs that are more ominous.

One clear problem illustrated by the CompuServe announcement is that ATM carrier services still are not really a going proposition. If they were, CompuServe would have trumpeted ATM service as the lead in their announcement. This indicates that at least one major player is not convinced that ATM service is worth merchandising at this time.

The second problem is that only very large companies can justify using ATM to carry various data traffic. CompuServe obviously has more traffic than most companies. If this sort of scale is needed to make ATM successful as a data-network efficiency builder, there won't be many ATM private networks sold.

Selling private ATM networks is important for the development of ATM because large corporations with private networks generate about 70% of the total data traffic. These organizations buy about the same percentage of customer premises equipment. If their ongoing network investment continues to be based on leased-line technology, how will they develop ATM applications that span the enterprise? Every dollar these users invest in WANs that are incompatible with ATM is an anchor holding them to today's networking practices.

Frame relay today is the foundation for most ATM switched networks, but frame relay is also the greatest risk ATM faces. Last year, the role of data applications in justifying ATM was finally recognized. But data applications in WANs don't necessarily need ATM.

Frame relay networks are used to interconnect traditional LANs. But they can also be used to interconnect ATM workgroups emulating traditional LANs. If frame relay taps this early source of ATM wide-area service demand, what will justify ATM?

> *Frame relay today is the foundation for most ATM switched networks, but frame relay is also the greatest risk ATM faces.*

The problem could become acute if ATM-based premises data architectures begin to exploit more advanced features of frame relay, such as switched virtual circuits or point-to-multipoint connections. With these capabilities, frame relay could take ATM's place in any of the proposed standard or proprietary ATM data architectures or LAN Emulation strategies.

There's more. If we can build switched LAN strategies without ATM in WANs, why not do the same on the premises? LAN switch-to-switch connections based on FDDI or fast Ethernet can't support a full range of multimedia applications. But if the wide-area service linking sites can't support those applications either, how much is lost?

Selling ATM switches in the near future is good for ATM only if there's an ATM position in the long term. By leveraging other data services to build traffic ATM networks can carry, we're giving ATM a breathing spell — preserving our option to commit to it for a little longer while we try to come up with an ATM philosophy that carriers, vendors and users can all buy into.

In the long term, hiding ATM behind other services without direct user commitment is a footnote in user technology planning. It might cut carrier service costs somewhat, but it would not have the impact we've all come to expect. And it certainly would not justify all the attention paid to ATM over the last four years.

Nolle is president of CIMI Corp., a technology assessment firm in Voorhees, N.J. He can be reached at (609) 753-0004 or via the Internet at tnolle@ix.netcom.com.

ELECTRONIC COMMERCE

How to use the Web to boost customer service

William Church

New technology rarely changes basic customer needs; it simply provides a new way to maintain your commitment to your customers. But, the Internet gives you the opportunity to provide true reactive and proactive customer sales and service.

Many of you see the Internet as a miracle drug. Therefore, you don't implement it strategically. But you should.

A recent survey by Call Center Enterprises, Inc. looked at how 500 large companies use the Internet. The survey revealed that 85 of those 500 companies have established a World-Wide Web site. Of the 85, only three — FedEx, AT&T and General Electric Co. — have Web sites that allow customers to interact in some way with company resources.

None of the companies surveyed linked their Web home page to a customer service representative to answer questions. Only two companies thought their customers needed links from their home page to other Web sites.

The facts are very plain: The first round of Internet customer service applications missed the mark; the second round definitely needs to be developed with an eye on providing comprehensive customer service.

Many of you have implemented interactive voice response units. The Internet offers you another source for inputting and outputting data, and you should carefully consider how the voice response units and the Internet applications will fit into that process.

At a minimum, your home page should provide everything available through the voice response unit. Otherwise, customers will see migrating to the home page as a step backward. Initial studies show an active voice-response-unit user has many characteristics of an Internet user.

Just as voice response units started as stand-alone technology and then became highly integrated, Internet applications have followed the same path. Integration, however, takes two forms.

The first, and simplest, is integration with other services. Your customers should be able to go from an Internet application to a customer service representative with all the screens they accessed transferred to the representative. This kind of integration has been common for three years between customer service representatives and voice-response-unit applications. There is no reason why the same can't be done on the Internet.

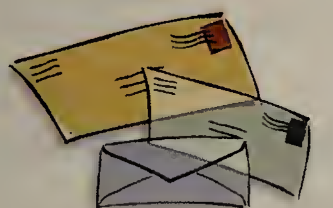
Second, the application should be integrated with other Web sites. This kind of integration provides you with a powerful platform for providing customer service. For a modem or network software vendor, there is always some issue with a related product that needs research. Your customers should be able to pop from a help screen in the primary application to FAQs at the modem or operating system vendor.

Through hotlinks, an Internet application can go from site to site gathering that information. This speeds the decision process without the need for human intervention. Between voice response units, Internet applications and other forms of electronic business, you must constantly examine your use of customer service resources. This doesn't mean you should force customers to use a service channel they don't want. But customers can be sold on the benefits of one channel over another, allowing you to adjust costs and meet customer expectations.

This reallocation will drive an additional round of consolidation in the call center industry. Consistently, customers now fulfill about 70% to 80% of their access needs through electronic channels. For example, 70% of calls to many banks are handled by voice response units. Given the potential that the Internet will attract those customers, you should rethink your entire disaster recovery plan and consider the need for multiple customer service centers.

Call centers have experienced round after round of technological advances. The automatic call distributor, voice response unit, computer-telephone integration and customer application software have been used to build and continually improve a sophisticated customer service model. The Internet will provide the much-awaited final automation link. You should be ready to accept this final change and start focusing on how to make the best use of a Web home page.

Church is CEO of Call Center Enterprises, Inc., a call center consulting company in Research Triangle, N.C. He is on the board of the Marshall McLuhan Center for Global Communication. He can be reached via the Internet at BAFnut@aol.com.



IN-BOX

Out-of-bounds

As an avid reader of *Network World,* I always cringe when I see an article written with an obvious product bias presented as a technology review. Your Technology Update article on voice over frame relay (Dec. 4, 1995, page 37) was out-of-bounds far enough to make me want to point out a few of the errors.

The article states that Algebraic Code-Excited Linear Prediction (ACELP) is being standardized as an International Telecommunication Union (ITU) specification. In reality, the G.729 algorithm will be ratified soon, but it will be Conjugate-Structure-ACELP (CS-ACELP), a significant enhancement to the ACELP algorithm. This is more complex and difficult to implement than ACELP, which happens to be what the author's company — StrataCom, Inc. — supports.

By ignoring the difference between the algorithms, the author implies that his company supports the standard, which is simply not true.

More importantly, regardless of what the ITU does with ratifying CS-ACELP, it has very little to do with the voice-over-frame relay products available today. Nobody supports G.729 (since it has not yet been ratified), and better 8K bit/sec algorithms exist already, although they are proprietary.

In another erroneous statement, the author says cell-based backbones are inherently better for voice-over-frame relay transport. While there are theoretical advantages to cell switching in terms of jitter performance, it is the available network bandwidth that is key to voice performance. Usually it is the bandwidth on the access links that causes the network jitter, since these are the lowest bandwidth links in the network. Due to the high overhead of cell protocols, these "thin" links generally use frame relay.

However, it is not surprising that the author put forth this argument since he works for a cell switch manufacturer.

Glen Gerhard
Product-line manager
PCSI
San Diego

The author replies: As Gerhard states, the version of ACELP that is being standardized by the ITU is different from today's commercially available ACELP algorithms. This, of course, is the nature of standards. In our opinion, it will be relatively easy for us to migrate to the standard algorithm due to our underlying technology. It was not our intention to imply (nor does the article state) that StrataCom's version of ACELP is identical to the ITU's proposed standard.

Gerhard is correct that no manufacturer's algorithm complies exactly with the standard today. It is important to note, however, that a standards-based protocol at 8K bit/sec will open the door for interoperability between different vendors' products, so long as they do not use proprietary protocols.

See **In-box,** *page 42*

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Circle Reader Service #46

Feature

What's beyond token ring?

By Charles Bruno

Bill Quinlan sees danger ahead, trouble he hopes to avoid.

The assistant vice president at insurance brokerage Johnson & Higgins in Manhattan has watched Lotus Notes traffic build to the point that it is nearly saturating the 100 token-ring segments across the company's 4,000-user enterprise network.

Quinlan and his network cohorts have been testing products for the past four months, trying to determine which technology — token-ring switching or low-speed ATM — will best curb the company's growing net congestion.

''We hope token-ring switching will play a big role for us, but 25M bit/sec ATM looks good too,'' Quinlan says. ''Which one is best? What should we do? We're still trying to answer those questions.''

Richard Rauscher, a network engineer at the H. Lee Moffitt Cancer Center and Research Institute in Tampa, Fla., already has his answers. The medical facility decided to dump its token-ring investment for the low prices and bountiful bandwidth of 100M bit/sec fast Ethernet.

''Even with replacing all the NICs in the hospital and the new switches, we believe [fast Ethernet] will be cheaper than token-ring switching,'' Rauscher says.

If you operate a token-ring shop, you too may face the prospect of selecting from among switching, FDDI, Asynchronous Transfer Mode and even fast Ethernet offerings to solve a variety of throughput problems that may arise on your 4M and 16M bit/sec token-ring LANs.

There are three key trouble spots that may prompt you to seek out high-speed alternatives: Congestion on backbone or server links, and mixed-speed token-ring LANs that force 16M bit/sec users to operate at the slower 4M bit/sec rate.

Which high-speed technology is best suited to solve those problems? Well, it depends.

Switching, dedicated token-ring standard can breathe new life into congested LANs.

PICK YOUR PROBLEM

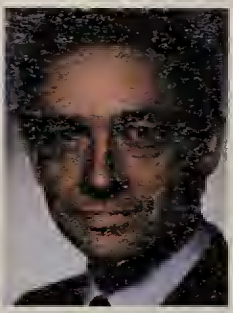
- Backbone bedlam: **Page 40.**
- Down on the server farm: **Page 40.**
- The token-ring speed trap. **Page 41.**

Bedlam in the backbone

Richard Hornbaker, a senior net engineer at American Express Co. in Phoenix, isn't ready yet to throw in the towel on token-ring nets.

"There's still a lot of life left for 16-meg token rings," Hornbaker says. "Largely the problem is in getting data from the servers to the users and providing true 16M bit/sec throughput across the backbone. That's where switching comes in."

By design, many token-ring LANs that span a campus or a building are hierarchical. Departmental rings feed into a building's backbone which ferries traffic among the different subnet stops. That backbone, in turn, ties into a campus backbone that serves as an interconnect with other buildings. The campus backbone links to other token rings in the enterprise over a wide-area connection.



Madge Network's *Taylor says your application mix is a telling factor.*

Compounding matters, bridges — sometimes supporting IBM's source route bridging technology — act as the hook into backbones. "Bridges operate far from wire speed and really put a drag on throughput," says Kevin Tolly, president of The Tolly Group, an independent testing center in Red Hook, N.J. "If you've got 10 16M bit/sec LANs feeding into a 16M bit/sec backbone via a bridge, you've got a point for traffic aggregation."

Even though the bridges may operate at wire speed, Tolly says, the net effect is equivalent to shoving 160M bits of data onto a 16M bit/sec backbone. Because the backbone is shared bandwidth, all the departmental segments will vie for backbone bandwidth simultaneously. "That's when things come to a crawl," Tolly says.

Conventional wisdom: Backbone congestion

Token-ring switching	▶ Better throughput than source route bridges ▶ Less costly than FDDI and ATM ▶ Dedicated token ring provides equivalent of 32M bit/sec bandwidth
ATM	▶ 25M bit/sec products provide strategic bridge to full-speed ATM ▶ Operates in full-duplex mode for efficient bandwidth usage ▶ Hefty prices may scare off some users
Fast Ethernet	▶ Lowest cost option ▶ Still a shared bandwidth approach ▶ Better availability of management tools than for token ring
FDDI	▶ Overly complex protocol ▶ Significant investment in personnel and time ▶ Problems bridging token-ring clients to NetWare servers on a FDDI ring

Historically, IBM's source route bridging also imposed a seven-hop limit between any two communicating devices. IBM eventually overcame the limitation, but not before major corporations deployed extensive bridged token-ring environments designed to avoid the hop-count ceiling.

The solution for most users is to replace the 16M bit/sec backbone with a multigigabit backplane on a switch that can accommodate traffic from other token-ring segments.

"It's a quick win; swap the backbone for a high-speed switching backplane and bang, you're there," says Tolly, who believes token-ring switching is the best solution to backbone congestion.

Adds Hornbaker: "[Token-ring switching] gives us the option of using ATM as a high-speed interconnect while still retaining the token-ring investment we made at the desktop."

A token-ring switch replaces either a wiring concentrator, nonswitching hub or a source route bridge, says Anura Guruge, an independent consultant based in New Ipswich, N.H. He says token-ring switching is compelling because it "allows you to tangibly increase LAN workgroup- or campus-level performance at a relatively low cost and with a minimum of risk and disruption to the existing token-ring environment."

One caveat, Guruge says, is that token-ring switches must support source routing if you want them to deal with separate token-ring numbers for multiple ring segments. In a scenario where a switch replaces several source route bridges, multiple ring numbers must be accounted for by the switch to ensure the network remains logically unchanged.

Not using source routing in backbones — and, therefore, having no ring numbers — has two drawbacks, Guruge says. First, it disrupts existing LAN management procedures that use ring numbers to identify LAN segments. It also precludes redundant paths, or duplicate media access control addresses on separate rings — two features often used by IBM's SNA for a degree of alternate routing. If you currently rely on ring numbers for management or redundant paths, evaluate only switches that offer source routing, Guruge says.

Another promising twist for token-ring users is the advent of dedicated token ring (DTR), also known as full-duplex token ring. DTR is an evolving IEEE 802.5 standard that enables a station to use the new Transmit Immediate mode when communicating with a token-ring switch — meaning it does not wait for a token to be passed, but transmits data when it needs to do so (see story, page 41).

TAKING A HIT

Performance degradation of token-ring LANs crops up when bandwidth utilization creeps past 70%. Ethernets, in contrast, begin experiencing performance hits even when running at less than 50% capacity.

SOURCE: ALLIANCE FOR STRATEGIC TOKEN RING ADVANCEMENT AND LEADERSHIP, PALO ALTO, CALIF.

In addition, a DTR node can send a 16M bit/sec stream of data at the same time it is receiving a 16M bit/sec stream, in effect providing 32M bit/sec of throughput. Token-ring switching may not be the proven tonic for every network user, warns Selina Lo, vice president of marketing for the Centillion Networks business unit at Bay Networks, Inc.

Token-ring switches support a limited number of ports — 16, 24 or 36. Once your needs exceed the port capacity of a single switch, you need a high-speed interconnect such as ATM to link the switches, Lo says. Since a single token ring generates up to 25,000 64-byte packets, you could quickly degrade a token-ring switch link if all ports are being used at full bore.

"Everything is fine and dandy with token-ring switching until you need the second switch," Lo says. "That's why ATM in the backbone is so important." ATM can handle upward of 175,000 packet/sec — enough, she says, to meet multiswitch demands. Centillion Networks was one of the first vendors to offer a token-ring switch designed around an ATM backplane.

Bill Quinlan, an assistant vice president at insurance brokerage Johnson & Higgins in Manhattan, thinks 25M bit/sec ATM may be another viable option. It provides greater bandwidth than token ring and uses fixed-size cells of only 53 bytes, which he says will result in less latency when moving packets across the network. By comparison, token-ring frames span from 18 bytes to 18K bytes.

However, John Curtis, a senior engineer/analyst with The Tolly Group, cautions that "it's wrong to make a blanket assumption that ATM limits latency. That depends on the network and the way the applications are written." Few applications today are written for native mode ATM transmission, Curtis says. That means users will need to employ ATM LAN emulation, which may carry overhead associated with data format conversion.

American Express isn't so sure about the need for low-speed ATM since dedicated token ring can effectively provide 32M bit/sec throughput in full-duplex mode. "Considering the software upgrade path with dedicated token ring, 25M ATM is questionable," Hornbaker says.

The choice of using FDDI, ATM or some other high-speed service to link switches depends on your applications mix and the amount of traffic traversing the net, says Martin Taylor, vice president of network architecture at Madge Networks, Inc.

"If you have modest traffic [generated by office automation applications], use token-ring switches," Taylor says. "If you are moving data from distributed databases or synchronizing data across your network, you may need FDDI or ATM as the interswitch trunk link."

Down on the server farm

The H. Lee Moffitt Cancer Center and Research Institute at the University of South Florida in Tampa traditionally has been an IBM token-ring network shop.

That is, until 100M bit/sec Ethernet happened along.

The health care organization, with more than 1,000 users on 13 token-ring

Can't get enough?

We've built links from Network World Fusion to a number of additional resources on token-ring topics, including:

- ▶ **The Tolly Group** home page, where you'll find product reviews on token-ring switches and bridges as well as other token ring-related research.
- ▶ **The Alliance for Strategic Token Ring Advancement and Leadership** home page. The vendor-sponsored organization offers white papers, information about its members and press releases about alliance activity. Some of the white papers you'll find include "Investing in Token Ring: A Guide for Network Managers"; "An Educational Guide To Token Ring"; "Token Ring Value Assessment Study"; and "Extending The Life of a Token Ring Network."
- ▶ **Nashoba Networks, Inc.'s** home page, where you'll find a very good guide on token-ring switching.
- ▶ A **University of New Hampshire** tutorial on the dedicated token-ring standard that will provide full-duplex transmission facilities for token-ring devices. The tutorial is written by Bob Love, the IBM senior engineer who is shepherding the standard's development.

Network World Fusion

subnets, had been searching for a way to end a nasty habit of servers losing their token-ring connections two to three times a day. That happened largely because of the number of people — often as many as 130 users per subnet — vying for the servers across a shared token-ring segment.

Conventional wisdom: Server-ring congestion

👍	**Token-ring switching**	▶ Eliminates bandwidth contention; each server is guaranteed 16M bit/sec ▶ When used with dedicated token ring adapters, you get throughput equal to 32M bit/sec ▶ Improves client response times by allowing server to transmit and receive data simultaneously
👉	**FDDI**	▶ Increases available bandwidth, but it is still a shared bandwidth option ▶ Must support protocol translation which may introduce data delays
👉	**ATM**	▶ Suited for large Unix application servers and application environments with high video/multimedia demands ▶ Expensive to implement vs. other options
👎	**Fast Ethernet**	▶ Radical shift, means replacing NICs and adding new switches ▶ Still a shared bandwidth approach unless used in conjunction with Ethernet switching ▶ Better availability of management tools than for token ring

Being an IBM customer, the cancer center listened to IBM's pitch for 25M bit/sec ATM. But, according to network engineer Richard Rauscher, IBM's message got drowned out by the sheer din of vendors shouting the merits of fast Ethernet. “IBM was talking strategy at the same time everyone else was showing us 100M bit/sec products that were faster and cheaper,” Rauscher says.

So, the cancer center yanked out its token-ring interfaces and dropped in the 100M bit/sec Ethernet net cards, creating a fat pipe to the servers in the machine room.

The move has “cleaned up a lot of the server congestion and improved response times,” Rauscher says. It also positions the organization to install Ethernet switches when the need arises.

H. Lee Moffitt's experience isn't all that different from that of other users with server farms connected to shared media token rings.

The traditional approach to server farms has been to centralize net servers in a glass-house approach and dedicate a single shared bandwidth token ring to supporting the servers.

“The trouble is, if I have four servers on that ring, I've just limited the average maximum bandwidth to 4M bit/sec,” says Kevin Tolly, president of The Tolly Group, an independent testing center in Red Hook, N.J. The problem intensifies as more servers are added.

DID YOU KNOW . . .

The token-ring topology was originally conceived as a protocol that would allow mainframe computers to communicate with one another.

SOURCE: ALLIANCE FOR STRATEGIC TOKEN RING ADVANCEMENT AND LEADERSHIP

The first step you should consider, says Selina Lo, vice president of marketing for the Centillion Networks business unit at Bay Networks, Inc., is to implement token-ring switching. By dedicating a port on a token-ring switch to each server, you guarantee wire speed to the device, Lo says.

That's the approach Bill Quinlan, assistant vice president at insurance brokerage Johnson & Higgins in Manhattan, is considering. The company's server rings are congested with Notes traffic. “We think the one-to-one connection between the switch and the server will ease congestion from the volume of traffic hitting the rings,” he says.

Another tactic to consider is using products that support dedicated token-ring (DTR) technology to improve server ring performance (see story, this page).

Since DTR supports full-duplex 16M bit/sec links, a server can transmit data to one user while it fields requests from others.

“DTR should help server performance overall because it effectively removes the blocking inherent in token passing,” Tolly says. “For the price of a software upgrade, you eliminate a situation where your receiving traffic holds up your server's transmit traffic.” The other benefit, he says, is that downstream clients can remain on their own shared bandwidth token rings, operating in half-duplex mode.

“This alone will help token ring stay around for a long while,” Tolly says.

However, Martin Taylor, vice president of network architecture at Madge Networks, Inc., cautions that DTR adapter prices may check in close to the cost of 25M bit/sec ATM products.

Since low-speed ATM is also a full-duplex technology, Taylor gives it the nod because it will provide more bandwidth and a smoother migration to more widespread ATM nets.

If 16M bit/sec token ring is not enough to satisfy server demands, then you may need to consider moving to 155M bit/sec ATM, Lo says.

FDDI, however, does not appear to be a viable option because it relies upon protocol conversion — from token ring to FDDI format and back again — which Lo says introduces some inherent delay.

ATM likewise introduces data conversion (from token-ring frames to ATM cells), Lo acknowledges, but that is handled by a segmentation and assembly hardware chip, which mitigates latency. Token ring to FDDI format conversion is usually handled via a software routine — a less efficient method.

Centillion's *Selina Lo says FDDI may not be an option due to delays caused by protocol conversion.*

Moreover, with ATM, you get low latency moving from hop to hop — at least to a point, says John Curtis, a senior engineer/analyst with The Tolly Group. “If the application is written purely for ATM, you incur less hop-by-hop latency,” he says. Other applications may demand ATM LAN emulation, which in turn may require frame formatting that could lead to added overhead.

“But with FDDI, you still store the 4K-byte frame at each hop before it is forwarded on to another point,” Curtis says. “That creates delay.”

Another issue with FDDI, Tolly says, is that testing has revealed some FDDI products may not be able to properly bridge token ring-based NetWare clients to NetWare servers sitting on an FDDI ring.

“We found some addressing problems there,” he says. “You could route the NetWare packets, but it would be impossible to bridge them.” Tolly also discounts any use of FDDI because of the complexity it forces upon users. “FDDI will require a significant investment in people and time,” he says.

In the event your aggregate bandwidth needs exceed 32M bit/sec, Tolly says, you could potentially use FDDI on a switch-to-switch basis. But if you are ready to make that move, he recommends you look to ATM.

Vendors pin the future of token ring to an emerging standard

Dedicated token ring (DTR) is an emerging IEEE 802.5 standard that allows a station connected directly to a token-ring switch to use the full capacity of the network rather than sharing it with others.

Workstations or servers that employ DTR can communicate at a full 16M bit/sec with an attached token-ring switch in full-duplex mode, instead of the usual half duplex. That means the DTR-enabled device can transmit and receive data simultaneously at 16M bit/sec — effectively providing 32M bit/sec in throughput.

“This gives companies with an investment in token-ring technology a little bit more life for their networks,” says Bob Love, a senior engineer at IBM and vice chairman of the IEEE 802.5 committee.

Part of what makes DTR so different from other token-ring implementations is there are only two transceiver units: the attached station and the token-ring switch port. Usually, there are as many transceiver units as stations on the ring.

That allows both the endstation and switch port to send data as needed in what is called the Transmit Immediate mode. Transmit Immediate provides double the bandwidth to any station that handles bidirectional traffic by keeping both the transmit and receiver channels open 100% of the time.

“That's because in Transmit Immediate mode, you're missing both the token and the ring,” Love says. In traditional token rings, he says, when a station sends data, it expects to see a return copy of the frames it transmits.

But that won't happen with Transmit Immediate because it uses a highly reliable transmit mechanism with a bit error rate of 10^{-9}.

“No other station can corrupt your data because you have a one-to-one relationship with the switch,” Love says. Heavily loaded servers, for instance, will benefit by being able to handle multiple read/write operations simultaneously.

“Typically, a server may be queuing up data to send back to one user, when a request comes in over the network from another user,” says Kevin Tolly, president of independent testing center The Tolly Group. “So the network is blocking the server's ability to transmit the data it has queued up until the server grabs the token to transmit. DTR eliminates that blocking.”

DTR ultimately will make its way to market in token-ring adapters outfitted with special microcode; even some existing 16M bit/sec adapters may be able to upgrade to the software.

Currently, DTR is out for its final IEEE balloting for ratification as a standard. Love doesn't expect any hurdles to stand in its way.

— Charles Bruno

Snagged in the token-ring speed trap

What do you get when you mix nine 16M bit/sec token-ring devices with a 4M bit/sec front-end processor (FEP) on a single token-ring segment?

As bizarre as it sounds, you get a 4M bit/sec token-ring segment.

That's because a single shared-bandwith token-ring segment can only support a single speed. And unless you're willing to pay the price to upgrade all devices to 16M bit/sec — which can be hefty in some cases — you're looking at a top speed of 4M bit/sec in mixed-speed segments.

That's the dilemma for users with significant investments in IBM FEPs, 3174 cluster controllers and even Application System/400 processors outfitted with 4M bit/sec token-ring cards.

The cost for a 16M bit/sec adapter for those devices can run upward of $20,000, making it unlikely many companies will upgrade.

However, by inserting a token-ring switch, you can selectively assign 4M and 16M bit/sec speeds on a port-by-port basis, enabling the different speed devices to coexist harmoniously.

This type of segregation is only possible if transparent switching is supported, says Anura Guruge, an independent consultant based in New Ipswich, N.H.

Among those that fit the bill are Nashoba Networks, Inc.'s Concord token-ring switch and Centillion Networks' Speed Switch 100, both of which support transparent switching as well as source routing.■

Conventional wisdom: Dual-speed token rings

Token-ring switching

- Allows you to assign switch ports at either 4M or 16M bit/secspeeds
- Eliminates need to upgrade devices to 16M bit/sec adapters
- Least expensive option to unite 4M and 16M bit/sec token-ring devices

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Letters

Continued from page 37

And I contend that cell-based backbones are theoretically superior for voice-over-frame relay transport.

I also have found this theoretical performance increase to hold true in real networks.

Since some implementations (such as StrataCom's) are also cell-based, even over the lowest speed frame relay link, the argument about frame relay links is moot.

Not so fast

Your article on fast LAN technologies (Nov. 6, 1995, page 34) quotes an analyst who said no routing interfaces are available for 100Base-T. This is not true.

3Com Corp. has been shipping a 100Base-T interface for its NetBuilder II router since July 1995.

Tracy Mallory
Software consulting engineer
3Com Corp.
Santa Clara, Calif.

COMMENTS?

See "How to reach us" on page 6.

Two routes to ISDN ACCESS

Ascend and Gandalf offer two good ISDN access router alternatives.

By Bob Larribeau

A key to successful implementation of an ISDN telecommuting program is selecting the right ISDN access router for your corporate network to support access from your remote users. Access routers have to support the remote devices that you want to use, provide access security, and produce accounting and other information required to manage a dial-up network.

Ascend Communications, Inc. offers the MAX 1800 and MAX 4000, which differ in configuration but use the same software. We looked at the MAX 4000, which has four ISDN Primary Rate Interface connections with a total of 92 B channels, an Ethernet connection, a V.35 port and six slots that can support option modules. The MAX 4000 we tested included two option modules — one with eight Basic Rate Interface interfaces and the other with eight V.34 modems.

Likewise, Gandalf Technologies, Inc. offers XpressStack and Xpressway, which use the same software. Like the MAX 4000, Xpressway has a modular hardware structure that lets you add hardware option boards. We looked at the XpressStack BRI, which has eight ISDN BRI connections with a total of 16 B channels and one Ethernet connection.

We tested each ISDN access router with both Ascend and Gandalf remote products — in Ascend's case, a Pipeline 25 and a Pipeline 50 ISDN router; and in Gandalf's case, a LANLine 5242i Teleworker Bridge and a LANLine 5242i Edge Router. Because of the proprietary implementations of both multilink and compression, we found better performance using products from the same manufacturer. These four remote products all have an ISDN BRI and an Ethernet interface. We found that both Gandalf and Ascend products were capable of throughput of more than 300K bit/sec.

Ascend's MAX 4000 was able to handle everything that we threw at it (see Figure 1, page 44). When connected to other Ascend products, it supports Stac Electronics, Inc.'s compression and Ascend's MP+ enhancements to the Internet Engineering Task Force's Multilink Protocol (MP). The MAX 4000 also supports two B-channel connections to Gandalf's 5242i Edge Router and 3Com Corp.'s Impact Digital Modem using the PPP MP. And it handles access with U.S. Robotics' Sportster 28,800 Data/Fax Modem.

The MAX 4000 had excellent performance when communicating with Ascend's Pipeline 50. We saw throughput over 300K bit/sec with the compressible file and better than 118K bit/sec with the incompressible file.

Performance with the Pipeline 25 was virtually identical when uploading files to the MAX 4000, but about 20% slower downloading the incompressible file and 40% slower with the compressible file. We measured the performance with Pipeline 50 using IP routing and Pipeline 25 doing both bridging and IP routing.

The MAX 4000 connected to Gandalf 5242i Edge Router doing IP routing gave solid performance with two B channels using the PPP MP. Its times on the incompressible file were at, or close to, the top of the group. The 5242i does not support compression with the MAX 4000; consequently, its performance was less than 40% that of the Pipeline 50 on the compressible files.

The performance of the MAX 4000 with 3Com's Impact under Windows 95 ranged between 58K and 71K bit/sec with two B channels. After we finished our testing, 3Com told us their performance with two B channels on the MAX 4000 would be better if we downloaded new software from Ascend. However, the throughput improvement of less than 25% that we saw in our testing does not justify doubling the connection costs by adding a second B channel.

U.S. Robotics' 28.8K bit/sec modem with Windows 95 Dial-up Networking worked well with the MAX 4000. The performance of the modem on the compressible file was 44K bit/sec and about 25K bit/sec on the incompressible file.

Gandalf's XpressStack BRI handled

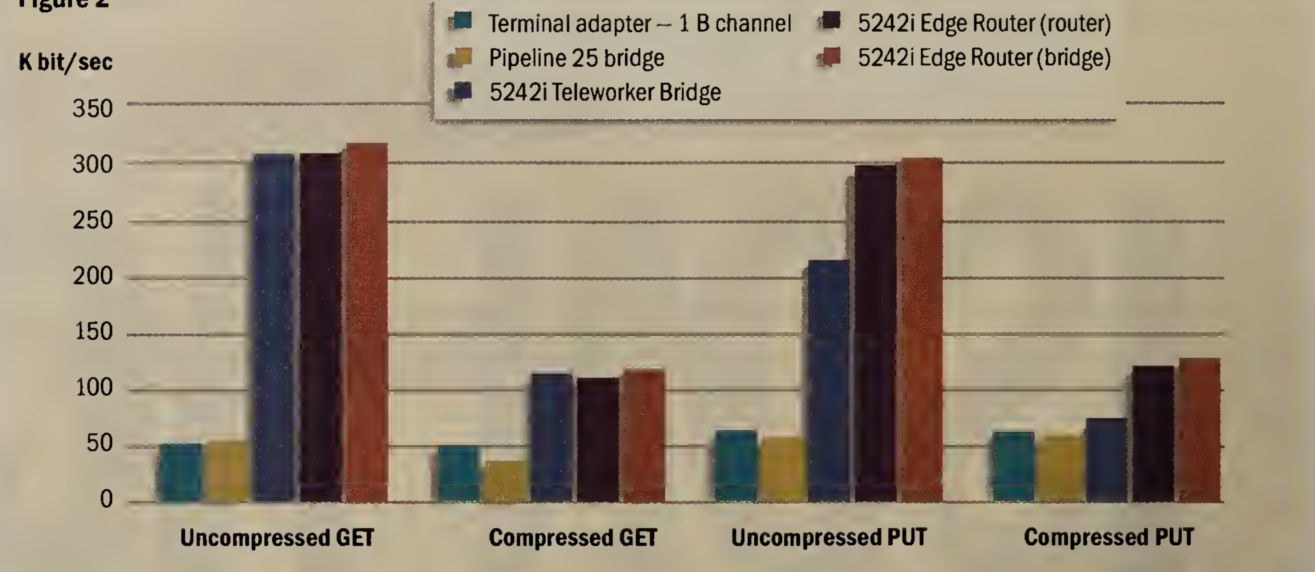
Continued on page 44

NetResults

Product	**MAX 4000**	**XpressStack BRI**
Vendor	Ascend Communications, Inc. (510) 769-6001	Gandalf Technologies, Inc. (613) 723-6500
Price as tested	$29,000	$9,500
Configuration tested	4 ISDN PRI interfaces, V.35 interface, 8 BRI terminal interfaces, 8 V.34 digital modems	8 BRI interfaces
Network interface	10Base-T and 10Base5	10Base-T
Network protocols supported	Bridging, IP routing, IPX routing with watchdog spoofing, V.120	IP routing, bridging, IPX bridging with watchdog, SAP/RIP and SPX spoofing
Pros	▲ Excellent performance with Ascend Pipeline products. ▲ Supported all products tested. ▲ Supports PRI and BRI. ▲ Supports V.34 digital modems.	▲ Excellent performance with Gandalf 5242i.
Cons	▼ PPP diagnostics insufficient.	▼ ISDN and PPP diagnostics insufficient. ▼ Did not support PPP Multilink Protocol with 3Com Impact.

Galdalf XpressStack BRI throughput

Figure 2



Continued from page 43

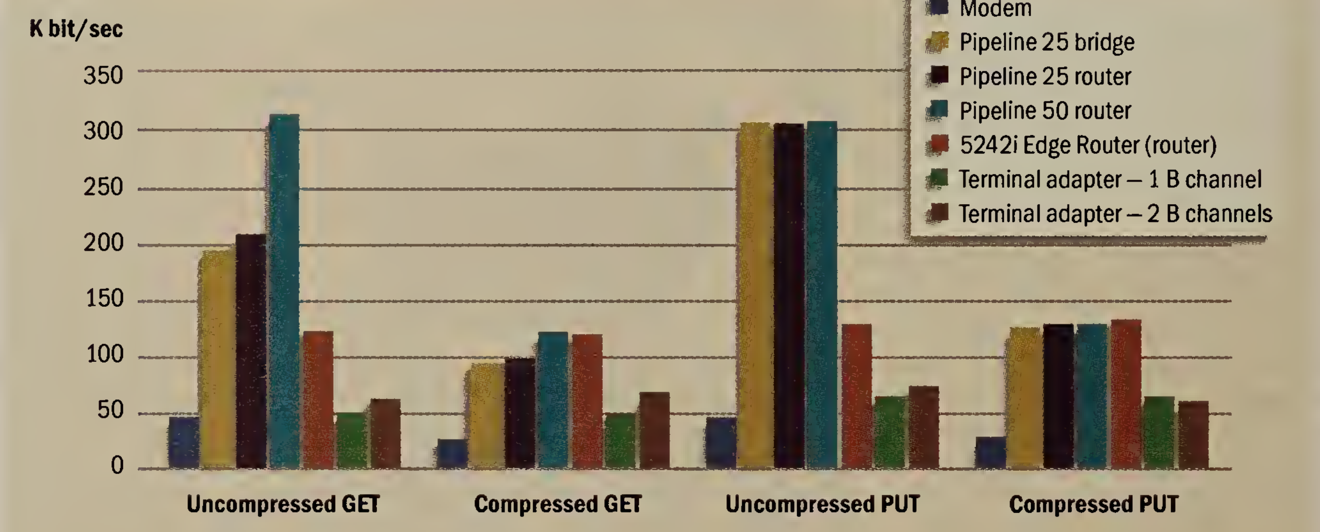
connection with LANLine 5242i using both Teleworker Bridge and Edge Router software (see Figure 2). Connections with Edge Router software were made using both bridging and IP routing. XpressStack does not support modem connections.

XpressStack connected to the LANLine 5242i with Edge Router software had performance that was virtually the same as that of MAX 4000 connected to Pipeline 50. In fact, XpressStack connected to Gandalf's 5242i Edge Router configured as a bridge edged out MAX 4000 connected to Ascend's Pipeline 50 doing IP routing for the best times in our tests by a hair. But our tests provided no evidence of a decisive advantage for Gandalf's proprietary compression protocol.

XpressStack performed virtually identically when downloading files from the 5242i with Teleworker Bridge software and Edge Router. But with Teleworker Bridge, it was 20% slower than with Edge Router uploading the compressible file and 40% slower uploading the incompressible file.

Ascend MAX 4000 throughput

Figure 1



Since we used the same hardware, the performance difference must have been due to the software implementation of Teleworker Bridge.

We were able to test XpressStack with the Pipeline 25 using one B channel. Ascend's MP+ extensions to the MP are not compatible with XpressStack, so we could not make two B-channel calls between the Pipeline 25 and XpressStack. The performance for this combination ranged between 36K and 58K bit/sec. This is fine for occasional access from a site that already has the Pipeline 25, but it is much too slow for a serious user accessing XpressStack.

The performance of XpressStack with 3Com's Impact under Windows 95 ranged between 49K and 61K bit/sec with one B channel.

Making connections

Connection time is a key measurement of the responsiveness of an ISDN system. The MAX 4000 was significantly faster than XpressStack in most of the connection times measured (see Figure 3, page 45). Connection time is an important measure of the responsiveness of a system since these products make and break connections based on traffic loading. We measured the time for both ISDN connection and PPP link establishment. The Pipeline 25 and 50 took about 3.3 seconds connecting to the MAX 4000. This is about twice as long as the 1.5 seconds we observed with an Ascend Pipeline 400, which is a four-BRI access router that also supports V.32bis modems. The difference is possibly due to the more complex call routing required by the MAX 4000's ability to support a much larger variety of BRI, PRI and modem calls. The 5242i took about 5 to 6 seconds to connect to XpressStack, independent of the software used.

The other interesting observation is the connection times for the Pipeline 25 connection to XpressStack. The Pipeline 25 connects to XpressStack in 2 seconds, compared to 5 to 6 seconds for the Gandalf products. In fact, the Pipeline 25 connects to XpressStack in about 40% less time than it connects to the MAX 4000. This makes it appear that Gandalf's longer connection times are due to the 5242i and not XpressStack itself.

Setup and operation

The MAX 4000 includes four interfaces that can be used for PRI or for T-1/E-1 connections, plus a V.35 interface that can be used for a frame relay connection in the base chassis. With all of this built in, the MAX 4000 can support a large population of remote users without adding modules to its six open chassis slots. Frame relay on the V.35 port permits the interconnection of a network of MAX 4000s on a WAN to support a geographically dispersed set of users. The MAX 4000 has option modules that permit it to support as many as 48 V.34 digital modem connections employing the same pool of PRI B channels used for the ISDN data connections.

Other hardware modules include BRI modules that support eight terminal or network interface ports. The MAX 4000 also supports modules that handle eight connections using the V.110 rate adaptation, which is extensively used outside of the U.S., as well as modules that support RS-232, V.35, RS449 or X.21 inverse multiplexing ports that can be used for data or video applications.

Optional software modules for the MAX 4000 include frame relay, ISDN and conversion of PRI to T-1. The MAX 4000 also has a software option to support Multirate ISDN, which supports switched Nx64K-bit/sec and switched 384K bit/sec services. Other software options include the Ascend Inverse Multiplexing and Bandwidth-On-Demand Interoperability Group specifications for videoconferencing applications; V.120 rate adaptation, used in the U.S.; and both RS366 and V.25bis autodialing.

With the right set of hardware and software options, the MAX 4000 can be used in a large variety of configurations that can include data communications and video. The MAX 4000 also can be used to drop and insert channels so a single T-1 can be used for data and video, as well as providing voice trunks to the private branch exchange.

Network World Fusion
http://nwfusion.com
For a discussion of using PPP with ISDN lines, select NetRef, Buyer's Guides and Reviews, then ISDN Access Routers.

Xpressway comes with either a four- or an 11-slot chassis. Gandalf offers modules that support BRI or PRI, asynchronous terminal communication using external modems, serial links for leased line, X.25 or frame relay connections.

Xpressway also has LAN modules that support Ethernet or FDDI switching, as well as Ethernet and token-ring wiring hub modules.

Both the MAX 4000 and XpressStack are relatively easy to set up and use. The MAX 4000 uses a hierarchical set of menus displayed along with a set of windows that show the current status of various aspects of its operation. XpressStack uses a character-based windowing system to access the various menus required to set it up.

With both routers, you set up profiles for each remote site to which you want to connect. The MAX 4000 requires you to navigate through subsidiary menus to access all the menu items for a single profile, while XpressStack puts all the menu items for a profile in a single screen.

Both products use these profiles to make calls based on IP addresses and to automatically set up the required dialing groups and static routes.

XpressStack has a mode where it will automatically set up a profile for each LANLine 5242i Teleworker Bridge that calls in, which can simplify initial setup.

Both products have indicators that show whether their ISDN links have initialized correctly. This ISDN line initialization confirms that their basic configuration, including Service Profile Identifiers (SPID), has been entered correctly. The MAX 4000 has a Test command in its Terminal Server Diagnostic mode that can do a loopback test. This Test

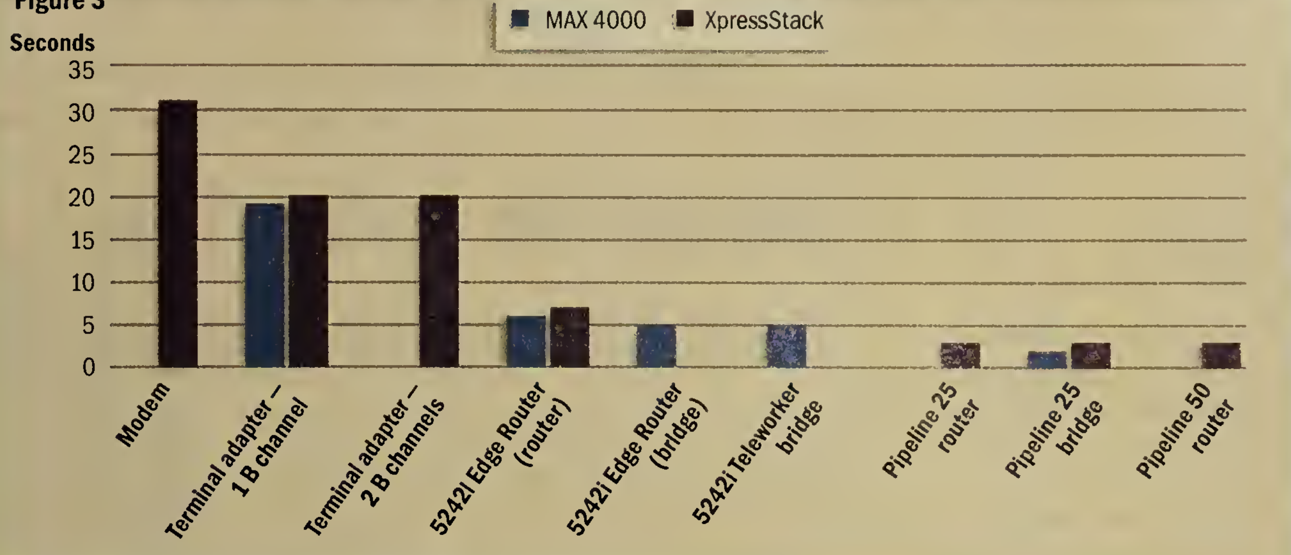
Interoperability

Both Gandalf Technologies, Inc.'s and Ascend Communications, Inc.'s products work best when the remote equipment and the access router are from the same company. Even though both companies' access routers support products from other manufacturers that combine B channels with the PPP Multilink Protocol, the lack of compatible compression often puts the multivendor approach at a distinct disadvantage.

— Bob Larribeau

Comparative connection times

Figure 3



Note: For various reasons, not all devices were used to connect to both ISDN access routes.

command works only with the PRI interfaces and not with the BRI interfaces with which we were testing. XpressStack does not have any capability for making a test call to verify the operation of the ISDN connections.

We ended up using remote products to make the initial connection tests with both XpressStack and the MAX 4000. Employing a remote unit rather than a local loopback to test ISDN connections works, but it is more difficult to determine if the problem is on the local or the remote side. Neither of these products provide all the kinds of information needed to diagnose connection problems.

The MAX 4000 shows the status of ISDN calls in small windows on the screen as they are placed or received. More information can be viewed in a special command-line diagnostic mode. These commands let you look at traffic statistics and at a log of the last 30 ISDN calling events. This is generally adequate for understanding why ISDN calls fail. The MAX 4000 gives very little information about why a PPP connection fails. If you are truly brave, the MAX 4000 has a debug mode that will give you hex dumps of either the ISDN Q.931 messages or the PPP packet exchanges.

XpressStack has a log that flags PPP authentication failures but does not provide information on other kinds of PPP failures. It does, however, provide information on ISDN call failures. In addition, XpressStack logs calls for accounting purposes, with the time and duration of each call, as well as a limited amount of information about why the call terminated.

Management and security

The two products have different management philosophies. XpressStack is self-contained and can store internally 1,000 connection profiles as well as its logs and accounting information. It keeps the 1,000 profiles in a table in the order that they were entered, rather than alphabetizing them, but it does provide a retrieval capability that can use wildcards in profile specifications to aid in finding a particular profile.

The MAX 4000 supports only 32 remote profiles internally, which is not nearly enough for a product that can support 92 B channels on its four PRI interfaces. With the 4000, you would use either the Remote Authentication Dial In User Service (RADIUS) or Terminal Access Controller Access Control System (TACACS) Unix-based remote authentication database servers, which support a database of remote profiles such as name, password, authentication method and routing information. The MAX 4000 refers to the RADIUS or TACACS databases as calls come in and uses information from them to set up the connections. During this process, the database is updated to show the current state of each connection.

Using external servers can make management more complex, especially for a single MAX 4000. On the other hand, TACACS and RADIUS provide a single authentication database that can be used by multiple access routers, which eliminates the redundancy required with Gandalf's approach of maintaining parallel databases in separate XpressStacks.

The MAX 4000 and XpressStack support both the PPP Password Authentication Protocol (PAP) and the Challenge Handshake Authentication Protocol (CHAP) authentication protocols. They also both support the use of Calling Line ID, an ISDN feature that provides the directory number of the caller, to verify the caller. The MAX 4000 also provides callback security. XpressStack authenticates the 5242i with Teleworker Bridge software by verifying the serial number of the calling 5242i.

XpressStack keeps audit records for each call that is attempted, whether it is successful or not. It can then send those records to an FTP server on an external system when the audit record buffers fill up or at a specifically selected time of day. The MAX 4000 supports an external Unix host-based SYSLOG facility for recording information about its operation, including call detail recording that can be used for billing purposes. Ascend told us that the SYSLOG information is useful in identifying and resolving connection problems, but without a Unix server to run it on, we were not able to use it directly ourselves.

Both ISDN routers support the use of Simple Network Management Protocol to monitor or actively manage these units. They both support the Management Information Base (MIB)-2 standard as well as their own MIBs or traps.

After testing, we believe that both Ascend and Gandalf have good product lines. For a network that can be supported by a single XpressStack or Xpressway, Gandalf's products may be preferable since their user profiles are managed within the unit itself. For larger configurations that require multiple units, the external RADIUS and TACACS authentication databases supported by Ascend's MAX products provide a centralized authentication system that eliminates the need to maintain parallel databases. ■

HOW WE DID IT

Our Gandalf Technologies, Inc. XpressStack and Ascend Communications, Inc. MAX 4000 ISDN access routers were networked to a 66-MHz 486 server running Windows NT and the Windows NT FTP server. We used various clients to connect to both devices — from a 133-MHz Pentium client running the Windows NT we connected via Ethernet-based Gandalf 5242i and the Ascend Pipeline 25 and 50 routers, and from a Texas Instruments 9100 90-MHz Pentium laptop we connected via Windows 95 Dial-up Networking using a 3Com Corp. Impact ISDN External Modem and an internal US Robotics Sportster 28,800 Data/Fax Modem. The 3Com Impact has a single ISDN BRI interface and an RS-232 interface. It can combine both B channels using the PPP Multilink Protocol (MP), but the maximum speed of 115K bit/sec on the serial port limits throughput to 92K bit/sec, well below the line speed of 128K bit/sec available on an ISDN BRI. The US Robotics Sportster is a V.34 modem with V.42bis compression. All modem connections were at 28.8K bit/sec.

With the 3Com Impact and the US Robotics modem, we measured connect time by waiting for the Windows 95 Dial-up Networking connection message to appear. This message is the only external indication that the connection has completed, so it is a fair measure of connection time. We could see with our protocol analyzer that this message appeared well after the PPP negotiation had completed, significantly lengthening the apparent connection time. We could not tell whether the Windows 95 Dial-up Networking extended the connection time as it did with the 3Com Impact ISDN Digital Modem.

Our performance tests consisted of running file transfers using FTP. We used two files — a compressible 295K-byte Excel spreadsheet and a 75K-byte version of the same file compressed using PKZIP. We tested the time to transfer these files in both directions in a lightly loaded environment to give a "best case" estimate of the performance of these configurations.

We also tested the connection time of each combination of products by measuring the time to make an FTP connection to transmit a tiny 75-byte file.

We emphasized the testing of PPP MP interoperability as defined by the Internet Engineering Task Force in RFC 1717 wherever possible. PPP MP supports combining two or more ISDN B channels into a single datastream of 128K bit/sec or higher in order to get full performance from an ISDN BRI.

We also used a Network Communications Corp. 7100 protocol analyzer to identify both ISDN and PPP problems, such as ISDN line initialization or calling problems. The analyzer allowed us to pinpoint the exact point where PPP negotiation failed. This made it easier to identify authentication problems and network control protocol errors, which seemed to occur with regularity. Network control protocol problems included selecting bridging, rather than routing or selecting compression on one side when it is not supported on the other side.

The remote side

It's also important to consider the products used on the remote side of an ISDN connection. Their purchase and support costs can be much higher than the cost of the net equipment.

The Ascend Communications, Inc. Pipeline 25 configured as a bridge and two plain old telephone service (POTS) ports, priced at $895 without compression and $1,195 with, is the price leader. The Gandalf Technologies, Inc. 5242i includes compression, which makes it much faster than the Pipeline 25 on many files, but it costs $1,450 when equipped with a POTS port.

— Bob Larribeau

The alliance is a cooperative of users, consultants, educators and integrators that applies its technical and business skills to analyze and compare strategic network products. A list of alliance partners can be found on page 37.

Larribeau founded Larribeau Associates, a consulting firm that specializes in ISDN technology, marketing and applications. He has been working with ISDN for 10 years. Larribeau has organized ISDN conferences for the California ISDN Users' Group for the past two years. You can reach him at bob@larribeau.com.

Management Strategies

Covering: Career Insights and Innovations
in Managing Staff, Budgets and Technology

Briefs

Osborne/McGraw Hill *has teamed with* **Stream International, Inc.** *to publish a technical support manual for Microsoft Corp.'s Windows 95.*

Windows 95 Answers: Certified Tech Support, *written by Martin Matthews and Carole Boggs Matthews, provides answers to the most frequently asked questions fielded by Stream International's support staff.*

The book can help your support staff when dealing with end users who run into problems when learning to operate Windows 95.

The book costs $19.95.

Osborne/McGraw Hill: (800) 227-0900.

Personnel Decisions International (PDI) *is offering a mix of software tools and services that will help net managers get a bigger bang for their training buck.*

The firm's **Development for Results** *program helps net managers build a coaching relationship with staff.*

The program includes: DevelopMentor Software that helps managers assess training needs and develop coaching strategies; The Information Series books that detail strategies for helping employees learn better; The Reference Series manuals that pass along the coaching knowledge PDI has compiled over 28 years; and The Training Series courses that help workers and managers master techniques espoused in the program.

PDI: (612) 339-0927.

Abra Software, Inc. *has agreed to integrate its payroll and human resources management software with* **Platinum Software Corp.'s** *Platinum for DOS and Platinum for Windows products.*

The integration will help net managers track employee costs in Platinum's client/server-based accounting packages.

Platinum Software: (714) 453-4000.

Using the authorities' help to nab that hacker

Last of two parts providing practical advice on how to prosecute network hackers.

By Winn Schwartau

Your network was pillaged. Valuable data and trade secrets were siphoned. You know how it was done and have captured the electronic addresses of the alleged perpetrators.

You have received the executive backing needed to bring law enforcement officials into the investigation.

more on-line

Share your experiences in prosecuting network hackers or let your peers know about the walls you've hit when attempting to prosecute a case in a special conference area on Network World Fusion. From the main menu, select Forum, Conferences, nwfusion.talk then Hackers — The Prosecution Case.

Since you have the OK, call these organizations:

■ The FBI's Computer Crimes Unit in Washington, D.C. This is a highly effective unit with computer forensic skills.

FBI: (202) 324-3000.

■ The Secret Service's Financial Crimes Division in Washington, D.C. As a Department of the Treasury division, this unit focuses on financial crimes and will investigate those committed over networks.

The Secret Service's Financial Crimes Division: (202) 395-2000.

Assuming you suffered a sizable loss, either agency will guide you through the prosecution process. The first step is evidence collection.

When your network was pried open, you undoubtedly collected an audit trail of all system activities, including those of your interlopers. Those files are now valuable evidence. Ask the law enforcement pros how to handle those files.

Network criminologists also will tell you how to collect new evidence and suggest the depth of additional monitoring appropriate for future break-ins.

They may ask you to add more sensitive alarms to your firewall or servers — something you probably want to do anyway. Increasing the sensitivity of these alarms will enable them to react in a more timely and useful manner when they detect unauthorized behavior.

Another valuable technique is the "honey pot." This attracts intruders by appearing to be an information gold mine. In fact, the information in the honey pot is of more value to you than the criminals because it has been seeded with nuggets of data that can only be found on your network's computers.

If and when an arrest occurs, the files found in the possession of interlopers hopefully will include the honey-pot nuggets so you can prove the bad guys visited your network.

As the investigation gets under way, it makes sense to have your corporate lawyers in the loop, as they can bring additional thoughts to this nascent field of law.

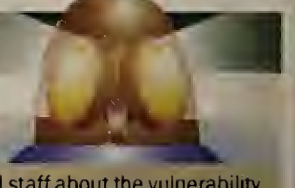
You also should tell your senior marketing or public relations personnel about the situation.

If the story somehow leaks out before the investigation concludes, you are far better off having a well-developed, coherent response that sounds more professional than a series of "I don't knows."

Above all else, remember there is no absolute right or wrong way to proceed in these situations. It's all gray.

Schwartau is president of Inter.Pact, Inc., a consulting firm specializing in information security and electronic privacy, and editor of "Security Insider Report," a monthly newsletter. He can be reached via the Internet at winn@infowar.com or by phone at (813) 393-6600.

Crime-wave reducers



Here are five things you can do to reduce the crime wave of network hack attacks:

- **Educate:** Create a minicourse to teach management and staff about the vulnerability of corporate data. Use E-mail to send security tidbits and consider using screen savers that give security tips.
- **Create a security policy:** Develop a coherent policy that protects corporate data and considers the privacy rights of individuals.
- **Implement the policy:** Provide enough money and staff to acquire, install and manage the technology to implement the policy.
- **Enforce the policy:** Unenforced, no one will take it seriously.
- **Prosecute offenders:** If the policy is violated by internal or external sources, be prepared to impose established penalties.

Heads of IBM, Netscape, HP to keynote at UniForum

CONFERENCE *planning*

UniForum '96, running Feb. 12-16 in San Francisco, will feature keynote addresses from IBM's Chief Executive Officer Lou Gerstner, Netscape Communications Corp.'s Chairman Jim Clark and Hewlett-Packard Co.'s CEO Lew Platt.

AT&T Bell Laboratories engineers will provide a special look at a new operating system called Plan 9 during a special session on Feb. 13 from 4 p.m. to 8 p.m., say show managers at Softbank Comdex, Inc.

Two-day seminars running Feb. 12-13 cover a mix of topics, from examining the business model for moving to a client/server environment to establishing a Web site. Conference sessions will range from integrating Microsoft Corp. technologies with open systems environments to managing distributed systems and nets.

Full registration costs $1,495 for UniForum members and $1,795 for nonmembers.

Softbank Comdex: (617) 433-1500.

Here's a look at other shows being held next month:

■ The Business Process & Workflow Conference runs Feb. 4-7 at Walt Disney World in Florida. Sponsored by Giga Information Group's BIS Strategic Decisions, the show will include a series of workshops, roundtables and special seminar tracks on workflow automation, document management and business process reengineering.

Attendees can test-drive six workflow products in a hands-on demonstration area.

The registration fee is $1,095.

BIS: (800) 874-9980, Ext. 2639.

■ Networks Expo Boston runs from Feb. 12-15.

The show will include an extensive list of full- and half-day tutorials and conference sessions, as well as an exclusive, hands-on technology lab sponsored by the Network Professional Association (NPA), an independent user group. The NPA will distribute a daily schedule of labs at the show.

There also will be a special computer-telephone integration lab that will show attendees how to hook telephone systems together with desktop computers and networks.

Full registration costs $950.

Networks Expo Boston: (800) 829-3976, Ext. 9346.

More details about these conferences can be found on Network World Fusion. Visit http://www.nwfusion.com and select Careers.

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Responsible for leading a technical team in the remote management of a client's Information Technology infrastructure, including providing services that meet all contracted service level agreements. Requires a BS degree and 5 or more years of technical experience and a background leading operational/service delivery teams. Exceptional interpersonal, leadership, coaching and management skills a must. Financial management experience desired.

CLIENT TECHNICAL ASSOCIATE

Responsible for monitoring and problem resolution of a client's Information Technology infrastructure. Involves heavy client interaction to provide enhanced help desk services and requires flexible work schedule to support a 24 hour/7 day a week operation. Requires a BS in Computer Science or Engineering and experience/skills in LAN, Desktop, Data, etc. Help Desk/Hot Line experience desired.

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S/W Technical Development Managers (Software Engineering Organization)

Applicant must have 4 years of work experience in Object Oriented technology, telecommunication business, 7 to 8 years experience in managing a large software development team. Knowledge of TMN and standards is a plus. Responsibilities include providing technical direction to the team in delivering an enterprise wide Network Management software solution, planning, budget management and personnel management. Response Code: S/W/NW

Quality Assurance Manager

Candidate must have 7 to 8 years experience in managing all aspects of software testing, quality assurance software change management, knowledge of software development, implementation, ISO 9000 certification, SEI capability maturity model. Responsibilities include managing and providing technical direction to the software test and quality engineers, planning, budget management and personnel management. Response Code: Q/NW

Information Modeling

Applicant must have 9 to 10 years of work experience in OO modeling techniques, in-depth knowledge of telecommunication standards such as ITU-T, Bellcore, ANSI, GDMOs, telecommunication domain knowledge. Experience in UNIX environment is a plus. Response Code: IM/NW

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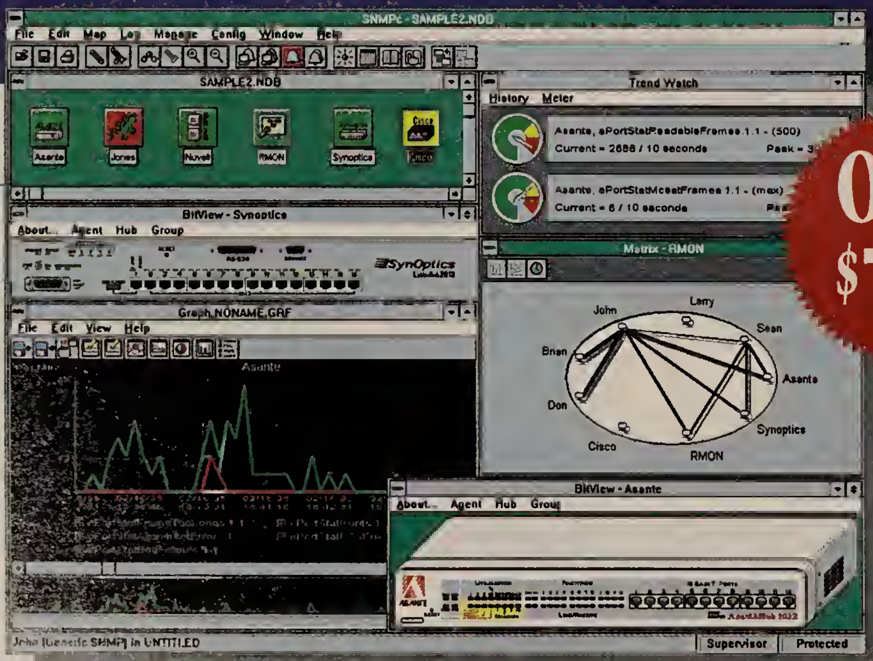

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Three concurrent analyzers per notebook PCMCIA-II slot	**Yes**	No	No
Expert analysis for 5000 protocol exceptions	**Yes**	No	No
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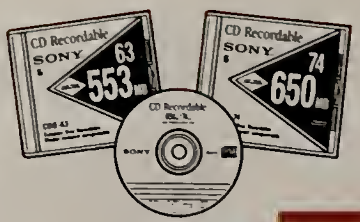

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4mm HS/90	9.64	9.03	8.72
4mm HS/60	7.87	7.37	7.12
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4mm-90M	11.55	10.82	10.45
4mm-60M	9.49	8.89	8.59
Hewlett Packard			
4mm HS/120M DDS 2	20.77	19.46	18.79
4mm HS/90M	11.18	10.47	10.11
4mm HS/60M	10.08	9.44	9.12
4mm Cleaning Cartridge - 2 pack	22.92	21.46	20.74
Maxell			
4mm HS/120 DDS 2	19.94	18.76	18.10
4mm HS/90	9.29	8.69	8.39
4mm HS/60	7.42	6.94	6.69
4mm Cleaning Cartridge	9.81	9.19	8.88
SONY			
4mm DG-120MA DDS 2	24.58	22.94	22.24
4mm DG-90MA	10.17	9.49	9.19
4mm DG-60MA	7.24	6.78	6.55
4mm Cleaning Cartridge	10.93	10.24	9.89
TDK			
4mm DG-120M DDS 2	20.44	19.14	18.49
4mm DG-90M	6.59	6.17	5.96
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8mm-160M - For XL Drives	15.15	14.19	13.69
8mm-112M	10.49	9.83	9.49
8mm-54M	10.04	9.39	9.08
12 Pass Cleaning Cartridge	18.37	17.19	16.62
Maxell			
8mm HS-8/160M - For XL Drives	14.16	13.26	12.79
8mm HS-8/112M	7.23	6.77	6.54
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8mm QG-160MA - For XL Drives	14.68	13.74	13.28
8mm QG-112MA	8.92	8.34	8.07
8mm QG-54MA	8.69	8.14	7.86
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DC-2120 QIC-80 Preformatted	13.19	12.36	11.94
DC-2120XL QIC80 Preformatted	15.84	14.84	14.34
DC-6150	13.08	12.24	11.83
DC-6250	16.89	15.82	15.28
DC-6525	22.34	20.92	20.21
Magnus 1.2GB	34.69	32.49	31.39
Magnus 2.5GB	48.64	45.54	43.94
Travan TR-1 400/800MB	26.93	25.22	24.37
SONY			
DC-2120 QIC-80 Preformatted	12.54	11.74	11.34
DC-6150	12.59	11.79	11.39
DC-6250	16.26	15.23	14.69
DC-6525	21.53	20.16	19.48
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5.25" 1.2GB 512 B/S Poly	81.94	76.94	74.34
5.25" 1.3GB 1024 B/S Poly	81.94	76.94	74.34
SONY			
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5.25" 650MB 1024 B/S	60.94	57.29	55.34
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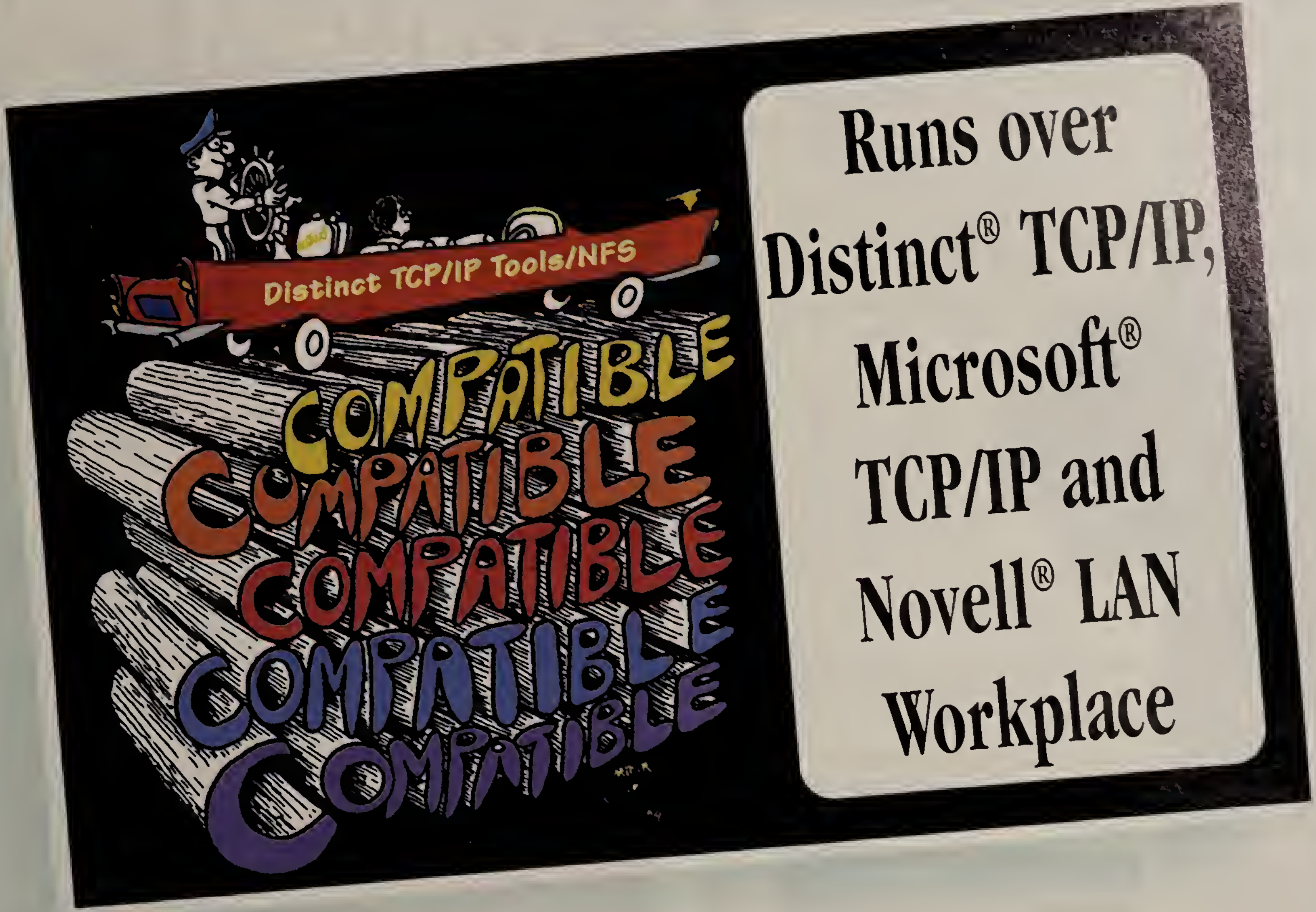
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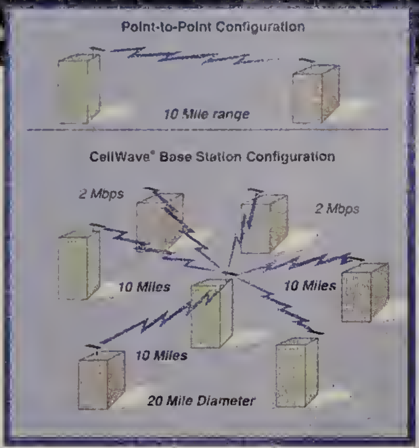

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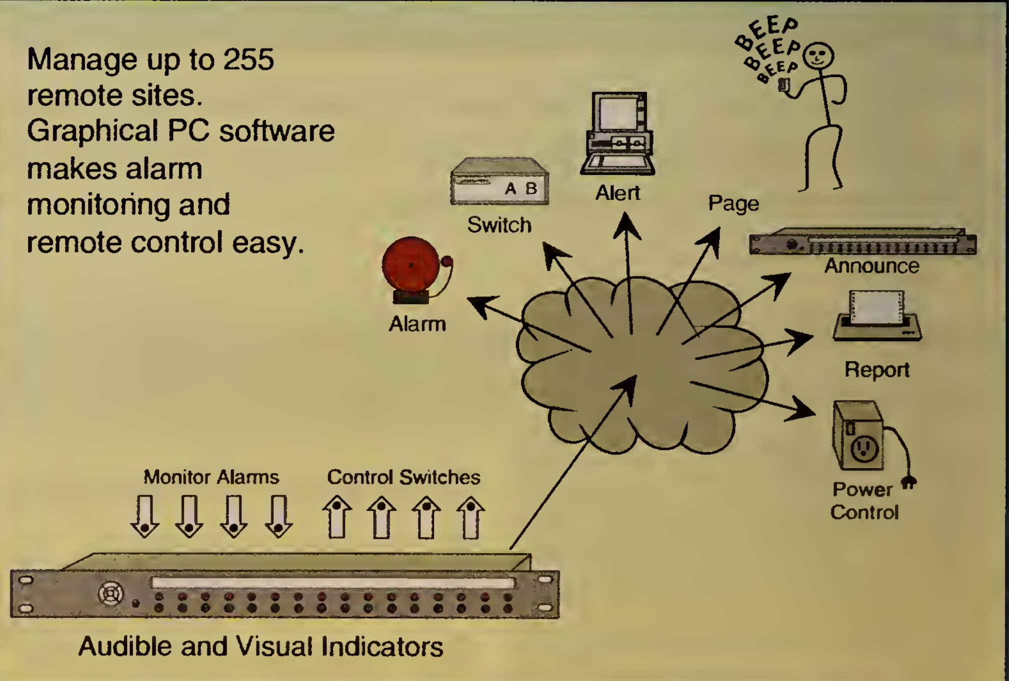

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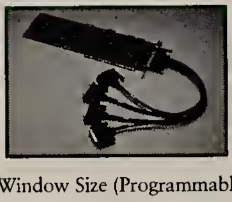

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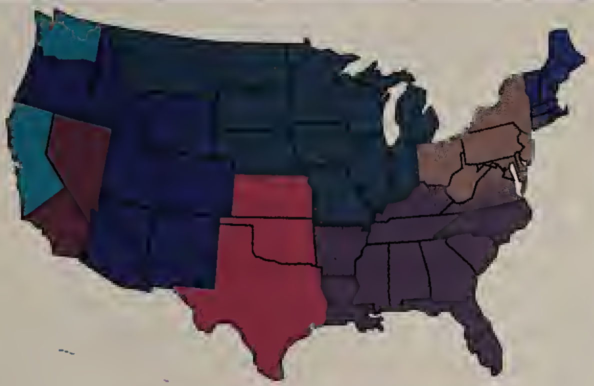

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ATM Forum

Continued from page 1

their own hands, lobbying for adoption of a 25M bit/sec alternative. So the forum embraced ATM25 — a move some say has confused customers and slowed ATM to the desktop.

The danger of such divisiveness is that the ATM Forum could fail at its critical job of ensuring interoperability among ATM products and services. That could slow the development of ATM offerings and keep potential buyers — concerned about being locked into proprietary solutions — on the sidelines as competing technologies like fast Ethernet take off.

"Infighting suggests chaos and no one needs that," said Frank Dzubeck, president of the Communications Network Architects, Inc. consultancy in Washington, D.C. "The spirit of the ATM Forum a few years ago was to get things out the door quickly and generate interest. That spirit is long gone and they need to get back to it."

"The ATM Forum was never more than a momentary juxtaposition of opportunities among the vendors, so it was always going to splinter," added Thomas Nolle, president of CIMI Corp., a consultancy in Voorhees, N.J. "We had a group of people who, for an instant, shared a common interest. But that instant in time is passing. When competitive pressure among vendors begins to exceed common interest, it becomes difficult to make progress."

Proponents say the 834-member, $5 million corporation that is the ATM Forum is experiencing nothing worse than adolescent growing pains. They also note that the pressure of setting the gold standard for a technology that has been hyped to death is no easy feat.

"We aren't like the Internet Engineering Task Force, where something like four people decide everything; we are a democratic body," said Roger Kosak, chairman of the ATM Forum's network management working group. "And a democracy has its strengths and weaknesses."

George Swallow, chair of the forum's Multiprotocol over ATM (MPOA) group, said dissension is a natural byproduct of democratic debate.

"ATM Forum vendors are trying to create a standard, and there are things that get done in a standards process that end up being optimized for one market niche or another," he said. Sometimes the minority takes things into its own hands, creating an alternative approach and "we end up with not as much interoperability as we might like," Swallow concedes.

ATM Forum at work

The forum has its work cut out for it in the months ahead as it finalizes key ATM specifications.

Technical working group:	Specification:	Expected approval:
LAN Emulation working group	LANE 2.0 LUNI Interface	October
	LANE 2.0 server-to-server interface	October
	LANE service MIBs	April
MPOA working group	Multiprotocol over ATM	February 1997
P-NNI working group	P-NNI 1.0	April
Signaling working group	UNI Signaling 4.0	June
Network management working group	Public network view	February
	SNMP MIB network element	April

SOURCE: ATM FORUM

But does that mean the ATM Forum is dividing or slowing down? No way, Swallow said.

"The ATM Forum's progress over the last six months has, from the outside, not looked that great," Swallow continued. "But, inside, we're doing a lot of things that need to be done."

For example, Swallow said individual working groups have been laboring to ensure that the forum's signaling, Private Network-to-Network Interface (P-NNI) and traffic management approaches will all work together. Because none of those working groups had scheduled time to ensure interoperability, "you're seeing all three of those specs being delayed. But the wait is well worth it," Swallow said.

Dzubeck has a different take. "If you put a snail and the ATM Forum in a race, the snail would win," he said.

Increasing delays are also opening the door for other technologies, such as fast Ethernet.

"More important than the dysfunction created by large numbers of vendors in the ATM Forum is the fact that fast Ethernet is just flying out the door," said Paul Callahan, director of the network strategy service at Forrester Research, Inc., a consulting firm in Cambridge, Mass. Fast Ethernet's acceptance will delay or displace ATM implementations, he said.

While alternative technologies put a dent in the rollout of ATM, most observers agree that it is the sniping that goes on between vendors that is most damaging to the forum's work. Early in the development of ATM, vendors were willing to bend on technology debates to help advance ATM. But as their products reach the market, providers aren't so willing to back down when their solutions lose out in the standards process.

Take the debate over ATM traffic management. The majority of forum participants sided with the rate-based mechanism. But vendors who didn't agree with the majority formed a group to push their approach, dubbed quantum flow control.

Users may wind up being forced to choose between the two mechanisms and deal with interoperability issues down the road, analysts said.

The vehement debate isn't necessarily bad. Nolle believes the most controversial issues have helped produce some of the forum's best work. Users now have alternative approaches that may fit their needs better. In fact, he lauds the group for relenting on ATM25 — an approach many felt was better than the 51M bit/sec standard initially adopted.

And the standards process can only take the technology so far. "We shouldn't be making marketplace business value decisions by locking a bunch of technicians in a room and having them hammer at one another," Nolle added. ■

NetworkWorld

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Apple

Continued from page 1

principal analyst for on-line strategies at Dataquest, Inc. of San Jose, Calif.

The Internet explosion surprised Microsoft Corp., but the software giant quickly regrouped and presented cross-company plans with an air of "we intended this all along."

Apple already is well positioned; Dataquest places the Macintosh fourth among server platforms on the Web. Apple claims it is second in commercial platforms, behind Sun Microsystems, Inc.'s Solaris.

"The Internet is incredibly strategic for Apple," said Doug McLean, who was designated director of Apple's CyberTech Products in late summer. Apple does not consider the 'Net a separate market, he said, but tackles it in each target category — consumer, education, business, publishing and entertainment.

A current priority is Cyberdog, a collection of OpenDoc-based component software to help third parties build or extend applications.

Cyberdog includes communications tools such as HTTP, File Transfer Protocol, Gopher, file translation utilities and electronic mail. A beta release is due next month.

"Cyberdog is intended to give developers the tools to write their own [products without worrying] about the plumbing," McLean said. "Our Internet priority is in building third-party tools."

Apple's partners are finding cyberspace success, even without the decisive leadership with which Apple defined and dominated desktop publishing. Apple independent software vendors also are nudging their third-party developers.

For example, database developer ACI US, Inc. in Cupertino, Calif., showcased at MacWorld some Internet applications that extend its 4D database.

"The third parties recognized the opportunity a good year before Apple," said Chuck Shotton, senior vice president of engineering for StarNine Technologies, Inc. of Berkeley, Calif., which developed the WebSTAR server that Apple bundles in its Internet Server Solution.

"Seven months ago, we had no Internet products; now we have about 14," said Emerick Woods, vice president of Internet solutions for Quarterdeck Corp. in Marina del Rey, Calif. Quarterdeck obtained some — but not all — of its 'Net products by acquiring StarNine.

"I don't believe you can be an Internet player without supporting the Mac," Woods said.

Certainly, Macintosh dominates design; and what is Web page authoring but publishing? Users seek familiar Macintosh tools to build Web sites.

The third parties oblige. For example, Adobe Systems, Inc.'s PageMill authoring software will be in Apple's updated Internet Server Solution, scheduled to ship within 60 days, along with a mail server and Domain Name Server.

"As far as composition of Web-related material, Apple has been a prime force for quite awhile," said Dataquest's Weiner. And Apple can do even better, he said, but the company must be aggressive.

"The window of opportunity may not be open for long," he said. But it might pay the bills. ■

Back to Reality

Blizzard of '96 was a giant headache, despite the public phone network

A week ago Sunday morning, I woke up and peered out the window. "Damn," I thought. "It's here."

"It" was a 2-inch blanket of snow, stuff our Realtor had promised would rarely plague the Deep South. I know: Two inches is nothing compared to the blizzard's brunt. But as delighted neighbors pranced in the powder, this erstwhile Yankee glowered with painful recent memories of a pickax and snow shovel.

The blizzard forced most Eastern seaboarders to spend last Monday at home. But while snow stopped the commuting, it did not stop all business. The papers contained several stories of people who used communications technology to outsmart Mother Nature.

David J. Buerger

According to reports published in *The Wall Street Journal,* long-distance calls through AT&T were up 35% Monday morning; conference calls were up 15%.

Bell Atlantic's local-call volume was double the usual figure; NYNEX's was up 60%. Some of those users had to wait for a dial tone and, once they got it, were rewarded with the fast busy signals signifying network congestion.

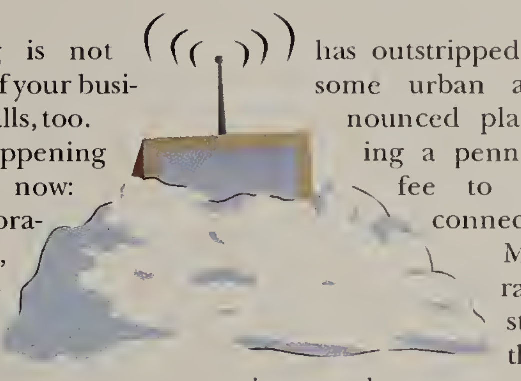
Internet service provider UUNET Technologies, Inc. reported East Coast business use down 15%, while home use rose 60%. My own access to New York-based PSINet/Pipeline was virtually impossible; once I got access, the system was slow.

No one knows what percentage of Monday's telecommunications service spike was work-related. Odds are that most of the spike was from people talking to friends and coworkers about the weather.

The relatively few elite users who are accustomed to mobile computing or telecommuting were no doubt smug at cleverly outwitting the storm. That self-congratulation might be premature.

The forced hibernation and concomitant huge network traffic spike actually teaches us a lesson. The public and private network system is inadequate for a massive shift to outside and home-based virtual work.

Yet this trend is the future. Many corporate network planners have misplaced priorities by focusing exclusively on fast internal networks. The strategic need for high-speed networking is not strictly within the walls of your business; it's outside those walls, too.



Look at what is happening in the business world now: Each week, corporations announce layoffs, downsizings, outsourcing deals and every imaginable change to the status quo.

Workers are becoming fungible — at least that's how corporate honchos are treating them. Knowledge workers' best hope is to be flexible, plugging in wherever work is available. Networking from home is the glue that will make this happen.

Smart people are preparing now. For example, Pacific Bell recently said that a big chunk of ISDN lines are going into homes. This is a new trend. The company predicts that by the year 2000, more than 70% of its anticipated one million ISDN lines will be in residences.

Unfortunately, even this technology will not make home workers full network citizens. It's too slow. Moreover, LAN applications presume that users have big bandwidth and constant connections. Those applications choke when remote workers try to use them.

Some are trying anyway. PacBell says 30% of its ISDN users log on more than 20 hours a week. Many keep links up all the time. Using ISDN like a LAN connection has outstripped switch capacity in some urban areas. PacBell announced plans to start charging a penny-per-minute usage fee to dissuade constant connections.

Meanwhile, corporate planners should start now to prepare their networks for increased remote use. Remote LAN access is a popular way to tie in outside workers to the corporate network. Over the long term, however, I expect most organizations will use the Internet as an external backbone transport instead of going through dial-up lines.

That means outside workers — be they employees or contract workers — will dial in to public Internet service providers instead of the corporate backbone. Internet access and throughput still need to be improved before providers can support a major societal shift to home-based work. Cable-based access will help bring fast LAN speeds into the home.

Some day, natural disasters like the Blizzard of '96 will be a mere hiccup as we conduct our virtual workflow. Meanwhile, even this curmudgeon admits that snow is beautiful — when you are watching the other guy shovel it.

Buerger is an Atlanta-based writer and industry consultant. He can be reached at dbuerger@pipeline.com.

CyberSpeak

Voices from the reader network

NEXT QUESTION

Is Java worthy of all this hype?

Responses due by 8 p.m. Thursday, Jan. 26. You'll get a T-shirt if we print your response. Please include your name, title, company and address.

What New Year's resolution should Microsoft make?

"Microsoft should sell off the hardware business. By doing so, they will be able to concentrate on the software industry instead of providing new keyboards that don't fit the desks and mouses that slow down when they get to any of the radio buttons in a GUI interface.

"Or better yet, perhaps Bill Gates should run for a judgeship. Just think of how efficiently the court systems would run.

"After that, Bill could run for President . . . imagine his success. And just think, it all started when Microsoft sold the little hardware business."

Harry Broderick, Woodside Consulting, Sparta, N.J.

"Their biggest resolution should be to set more reasonable and real schedules for shipping products. It's difficult for us as a reseller when they announce a new product and one and a half years later it comes out, and we have customers sitting there saying they are not going to do anything until it ships, like with Windows 95 and Exchange."

Derrick DeCarlo, vice president of operations, SafeNet, Inc., Atlanta

"To buy Banyan Systems and put us VINES users out of our misery."

John Scoggin Jr., supervisor of network operations, Delmarva Power & Light Co., Newark, Del.

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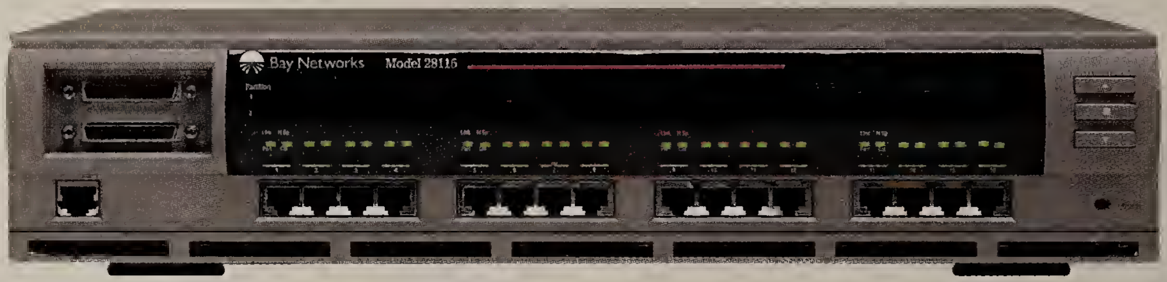

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